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Module 3

Mathematics 5

Fractions and Decimals

Learning Technologies Branch

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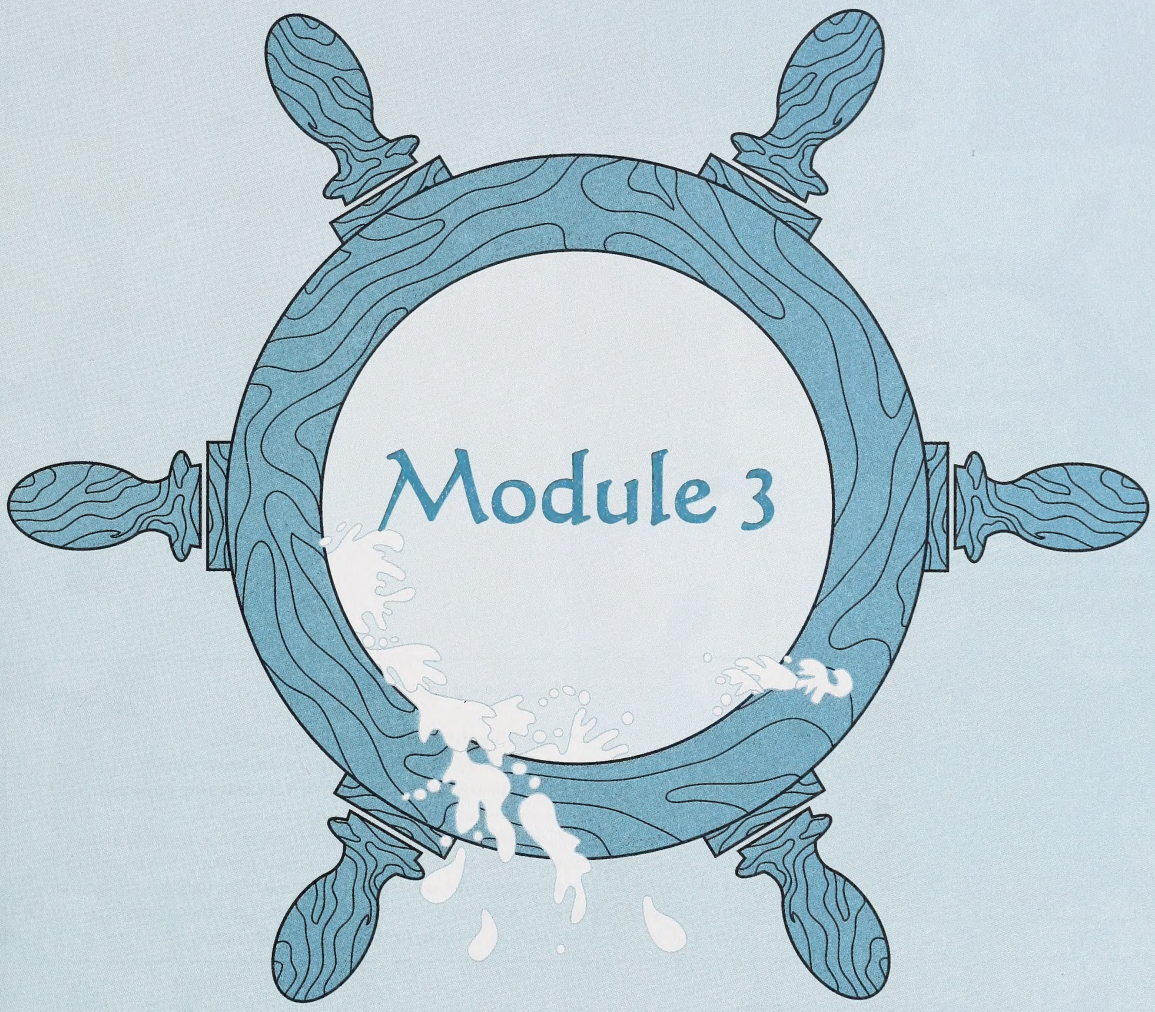
Mathematics 5



Fractions and Decimals

Learning Technologies Branch

Alberta LEARNING

Mathematics 5
Module 3: Fractions and Decimals
Student Module Booklet
Learning Technologies Branch
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Students	✓
Teachers	✓
Administrators	
Home Instructors	
General Public	
Other	

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- Learning Resources Centre, **http://www.lrc.learning.gov.ab.ca**

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Welcome Aboard
Mathematics 5

Ahoy! Mathematics 5 contains nine modules.
You should work through the modules in order (from 1 to 9) because concepts and skills introduced in one module will be reinforced, extended, and applied in later modules.

Module 1
Whole Numbers

Module 2
Patterns

Module 3
Fractions and Decimals

Module 4
Transformations

Module 5
Data Analysis

Module 6
Chance and Uncertainty

Module 7
Length and Area

Module 8
Volume, Capacity, Mass, and Time

Module 9
2-D Shapes and 3-D Objects

Adventures on the High Seas

Kassidy: Connor, guess what? I noticed an advertisement in the newspaper. A second-hand bookshop just opened, and it's supposed to have some really old books from all over the world.

Connor: Some may even be older than our great-grandparents! Let's go take a look.

Excited about what they might find to read, Connor and Kassidy hurry off to the bookshop.

Connor: Wow! Look at this, Kassidy. Here's an actual journal kept by Captain Quinn almost 300 years ago. It's kind of musty, and parts are hard to read, but look at how much math the captain used!

Kassidy: There are also maps, descriptions of ships, and reports about sea conditions.

Connor: Let's buy it. Figuring out what the journal says will be like unravelling a mystery. Maybe it will have clues about real buried treasure.

From time to time throughout the course, you will work with many of the facts and figures about the days of sailing boats and sea captains that Kassidy and Connor discover.

Table of Contents

Course Features 8

Assessment and Feedback 10

Module Overview 11

Numbers in the News 13

Lesson 1: Fractions as Parts of a Whole 14
- Activity 1 15
- Activity 2 18
- Activity 3 20
- Activity 4 24
- Activity 5 26
- Challenge Activity 29
- Conclusion 30
- *Lesson 1 Assignment* 30

Lesson 2: Fractions as Parts of a Set 31
- Activity 1 32
- Activity 2 35
- Activity 3 38
- Challenge Activity 41
- Conclusion 42
- *Lesson 2 Assignment* 42

Lesson 3: Connecting Fractions and Decimals 43
- Activity 1 44
- Activity 2 48
- Activity 3 52
- Challenge Activity 55
- Conclusion 55
- *Lesson 3 Assignment* 55

Lesson 4: Comparing and Ordering Fractions and Decimals 56
Activity 1 57
Activity 2 59
Activity 3 61
Challenge Activity 65
Conclusion 66
Lesson 4 Assignment 66

Lesson 5: Adding and Subtracting Decimals 67
Activity 1 68
Activity 2 70
Activity 3 71
Challenge Activity 72
Conclusion 73
Lesson 5 Assignment 73

Lesson 6: Multiplying and Dividing Decimals 74
Activity 1 75
Activity 2 77
Activity 3 79
Activity 4 84
Challenge Activity 85
Conclusion 86
Lesson 6 Assignment 86

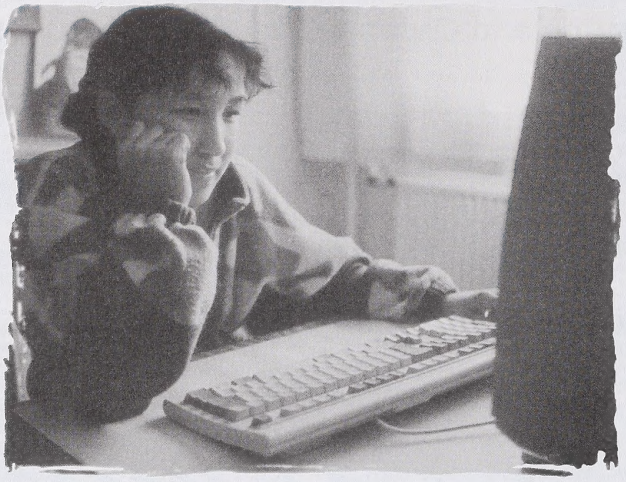
Module Summary 87
Numbers in the News 87

Keystrokes 88

Review 91

Appendix 93
Glossary 94
Answer Key 94
Image Credits 144

Course Features



BRYAN AND CHERRY ALEXANDER PHOTOGRAPHY

Take the time to look through the Student Module Booklet and the Assignment Booklets and notice the following design features.

- Each module has a Module Overview, Module Summary, and Review.
- Each module has several lessons. Each lesson focuses on a big idea that is central to the topic being learned in the module.
- Each lesson has several activities. An activity in each lesson is related to the high seas adventure theme. The last activity in each lesson is a Challenge Activity.
- Each module has a Glossary and an Answer Key in the Appendix. In several modules there are also special pull-out pages in the Appendix.
- Each module has special exercises that focus on certain mathematical skills. For example, The Numbers in the News project involves a scavenger hunt for samples of math in everyday life. The Keystrokes exercise introduces some "funky features" of the calculator that can be used to explore and practise important number ideas.

Required Resources

There are no spaces provided in the Student Module Booklets for your answers. This means you will need a binder and loose-leaf paper or a notebook to do your work.

In order to complete the course, you will need a copy of the Mathematics 5 textbook, *Quest 2000: Exploring Mathematics*, the soft-cover book *Quest 2000: Exploring Mathematics: Practice and Homework Book*, a basic four-operation calculator (such as the TI-108 calculator), and various manipulatives (base ten blocks and pattern blocks).

If you wish to complete the optional computer activities, you must have access to a computer that is connected to the Internet.

Visual Cues

For your convenience, the most important mathematical rules and definitions are highlighted. Icons are also used as visual cues. Each icon tells you to do something.

Use your calculator.

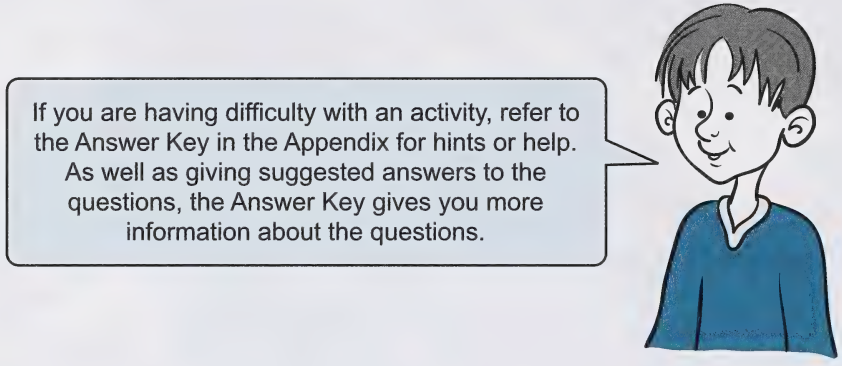
Use the Internet.

Refer to the textbook or the Practice and Homework Book.

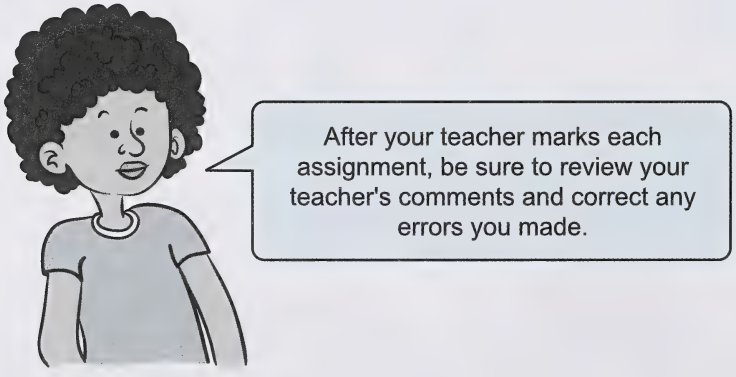
Your guides for this course are Kassidy and Connor.

Assessment and Feedback

The Mathematics 5 course is carefully designed to give you many opportunities to discover how well you are doing. In every activity you will be asked to turn to the Appendix to check your answers. Completing the activities and comparing your answers to the suggested answers in the Appendix will help you better understand math concepts, develop math skills, and improve your ability to communicate mathematically and solve problems.


If you are having difficulty with an activity, refer to the Answer Key in the Appendix for hints or help. As well as giving suggested answers to the questions, the Answer Key gives you more information about the questions.

Twice in each module you will be asked to give your teacher your completed assigments to mark. Your teacher will give you feedback on how you are doing.



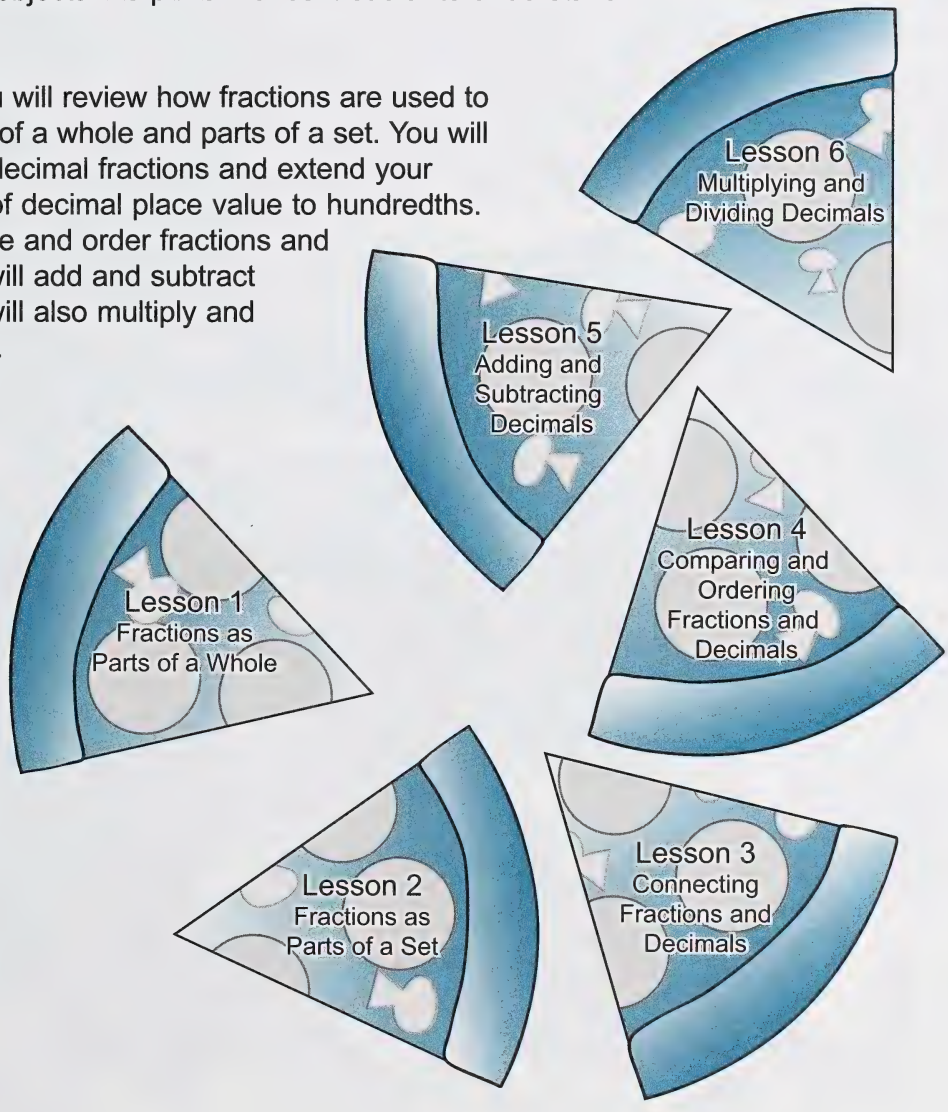
There will be a final test at the end of the course. You can prepare for the final test by completing the Review at the end of each module.

Module Overview

Kassidy and Connor want to share a large pizza with two of their friends. Because the children prefer different toppings, they decide to order a cheese pizza and ask the pizza parlour to put pepperoni on $\frac{1}{2}$ of the pizza, mushrooms on $\frac{1}{4}$ of the pizza, and green peppers on $\frac{1}{4}$ of the pizza.

Thinking about objects like pizza makes it easier to understand fractions.

In Module 3 you will review how fractions are used to represent parts of a whole and parts of a set. You will also work with decimal fractions and extend your understanding of decimal place value to hundredths. You will compare and order fractions and decimals. You will add and subtract decimals. You will also multiply and divide decimals.



Your mark on this module will be determined by how well you complete the two Assignment Booklets.

The mark distribution is as follows:

Assignment Booklet 3A

Lesson 1 Assignment	22 marks
Lesson 2 Assignment	17 marks
Lesson 3 Assignment	14 marks

Assignment Booklet 3B

Lesson 4 Assignment	13 marks
Lesson 5 Assignment	12 marks
Lesson 6 Assignment	12 marks
Numbers in the News	10 marks
Total	100 marks

When doing the assignments, work slowly and carefully. Be sure you attempt each part of the assignments. If you are having difficulty, you may use your course materials to help you, but you must do the assignments by yourself.

You will submit Assignment Booklet 3A to your teacher before you begin Lesson 4. You will submit Assignment Booklet 3B to your teacher at the end of this module.

Numbers in the News

Numbers are everywhere! Newspapers and magazines are full of stories and advertisements that show how numbers are used every day.

The following scavenger hunt asks you to look through newspapers and magazines for samples of number ideas like those you will be using in this module. Read through the list now and begin by collecting samples of the ideas you already understand. You may collect other samples as you learn about them in the module. Collect as many samples as you wish.

Scavenger Hunt

Cut out samples of each of the following number concepts from newspapers, flyers, and magazines.

1. fractions that represent parts of wholes
2. fractions that represent part of sets
3. decimals showing tenths
4. decimals showing hundredths
5. decimals being added and/or subtracted
6. decimals being multiplied and/or divided by a whole number

You will find further instructions for submitting your project in Assignment Booklet 3B.

Lesson 1

Fractions as Parts of a Whole

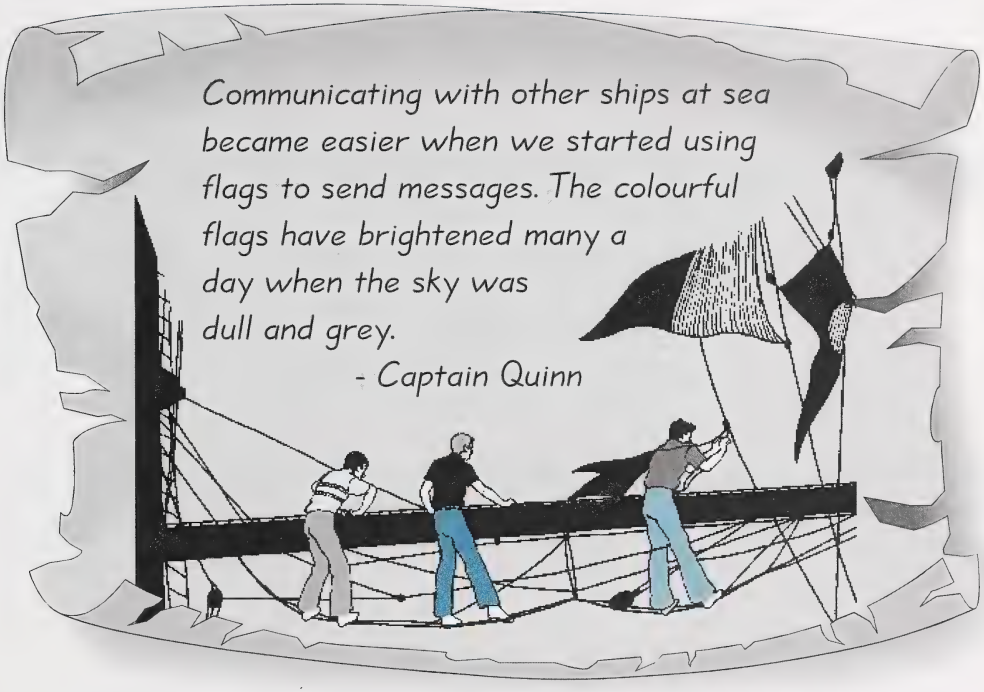
The coins Captain Quinn and his crew used were valued by their weight and metal content, not by their face value, as coins are valued today. By actually cutting a whole coin into pieces, a sailor could spend a piece of the coin in one place and use the other pieces somewhere else.

Because the coins were often divided into eight equal pie-shaped pieces, the money became known as "pieces of eight." A piece of eight was, in fact, $\frac{1}{8}$ of a whole coin.

In this lesson you will explore the concept of fractions as parts of a whole. You will also work with equivalent fractions.

Activity 1

Today you will explore fractions as parts of a whole.


Communicating with other ships at sea became easier when we started using flags to send messages. The colourful flags have brightened many a day when the sky was dull and grey.
- Captain Quinn

Kassidy and Connor were fascinated by the flag messages that Captain Quinn described. They did some research and discovered that the flags are still used today to spell out short messages.

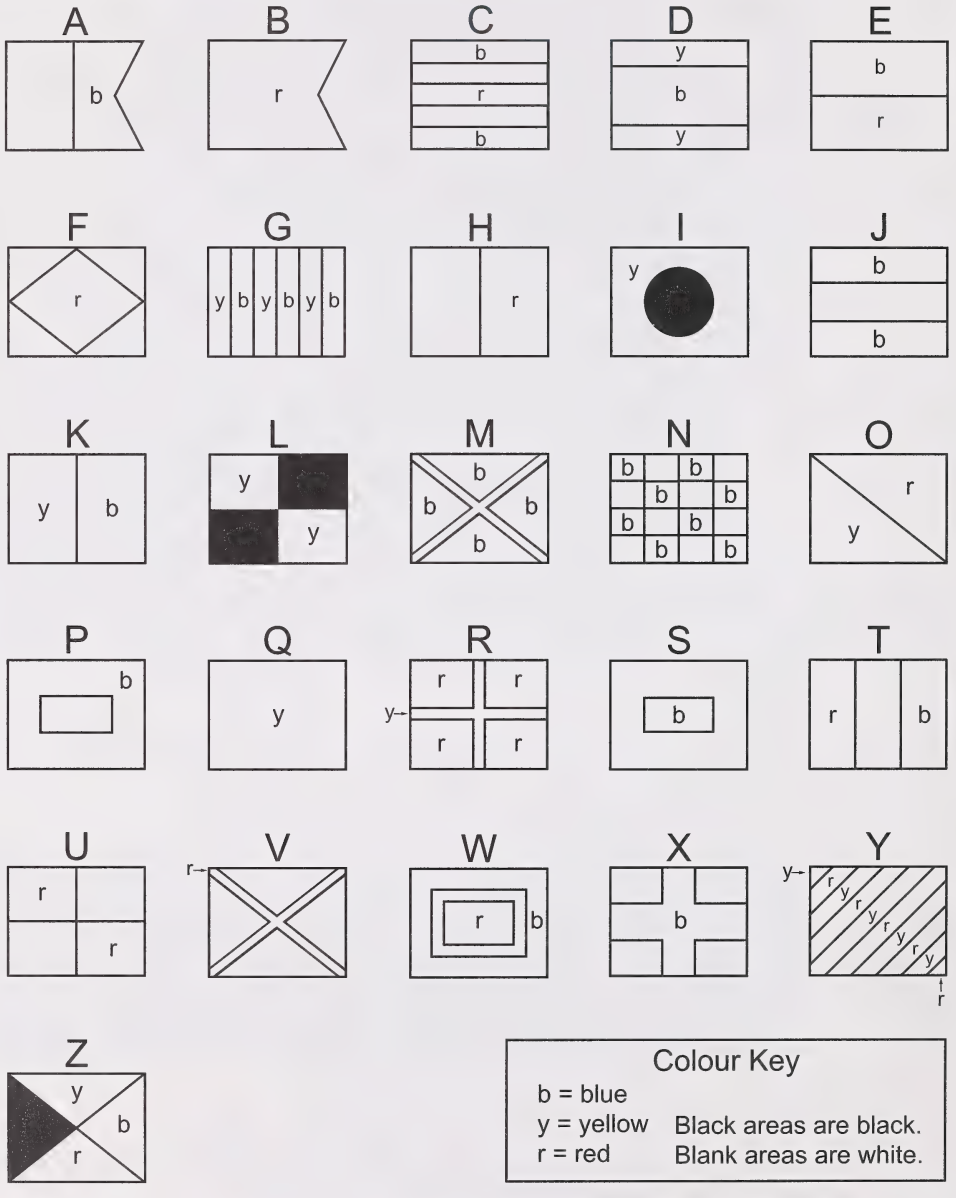
Use the Internet (or a library) to research the flag alphabet and the special meaning of each of the flags when they are used individually. You may find the following website helpful:

http://www.sailors.com/images/flags

Each flag in the flag alphabet has one or more of the following colours: red, yellow, blue, white, and black. The bright primary colours, along with black and white, make the flags easy to identify.

Colour the flags using the colours that are shown in the colour key, and then use them to answer the questions that follow.

Flag Alphabet



Some of the flags are divided into equal parts that can be represented by **fractions**.

1. **a.** What fraction of the flag for the letter Z is black?
   b. Explain what the numbers in the fraction you wrote mean.

2. **a.** What fraction of the flag for the letter C is blue?
   b. Explain what the numbers in the fraction you wrote mean.

Check your answers on page 94 in the Appendix.

Fractions are usually written vertically with the **numerator** above the bar and the **denominator** below the bar.

The denominator tells the number of equal parts in the whole. The numerator tells how many parts are being considered.

3. Name the letter of the flag that is $\frac{1}{3}$ blue.

4. Name the letter of the flag that is $\frac{1}{2}$ blue and $\frac{1}{2}$ red.

5. **a.** What fraction of the flag for the letter J is white?

   b. What is the letter of the flag that shows the same fraction of white as the flag for the letter J?

   c. Explain how you know the white areas on these two flags are the same size even though the white areas on the two flags are different shapes.

6. **a.** What fraction of the flag for the letter H is red?

   b. What are the letters of the flags that are divided into the same number of parts as the flag for the letter H, and which show the same fraction of red as the flag for the letter H?

7. Connor wonders if the flag for the letter D is $\frac{1}{3}$ blue. Explain what you would tell Connor.

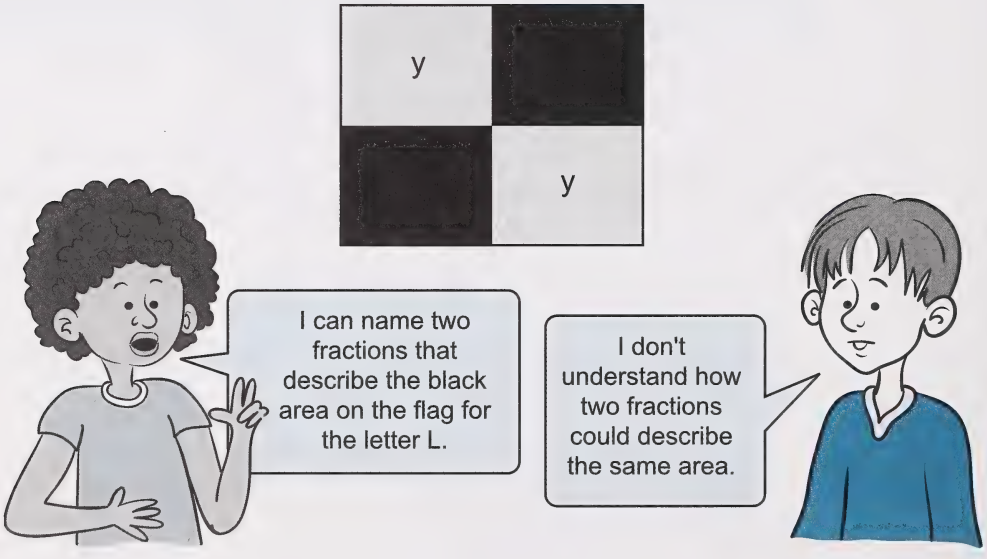
8. Design a rectangular flag that is $\frac{1}{4}$ blue and $\frac{3}{4}$ yellow. Draw a picture of your flag.

Check your answers on pages 94 and 95 in the Appendix.

Activity 2

Today you will explore equivalent fractions.

Following is the flag for the letter L:


y
y
I can name two fractions that describe the black area on the flag for the letter L.
I don't understand how two fractions could describe the same area.

1. **a.** What fractions might Kassidy use to describe the black areas on the flag for the letter L?

b. Fold a rectangular piece of paper so that when you unfold it, it shows the same areas as on the flag for the letter L. Draw a picture of your results and colour the flag.

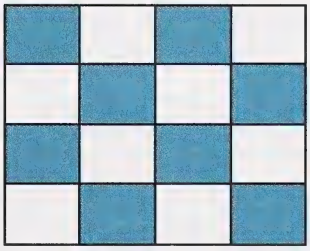
c. Explain how your folded paper can be used to show that both fractions you wrote describe the same size area.

d. Which other flag is divided into the same four areas as the flag for the letter L but uses different colours?

Check your answers on page 95 in the Appendix.

Different fractions that name the same amount are called **equivalent fractions**.

2. a. What equivalent fractions could you use to describe the blue area on the flag for the letter N?

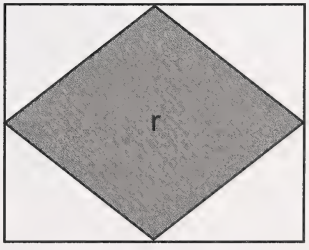


b. Explain how you could fold a rectangular piece of paper so it looks like the flag for the letter N. Then explain how your folded paper can be used to show that the fractions you wrote describe the same size area.

3. a. For which alphabet flag would you use the fraction $\frac{3}{6}$ to describe the blue area?

b. Write a fraction that is equivalent to $\frac{3}{6}$ but that has a smaller denominator.

4. a. What fraction of the area on the flag for the letter F is red?



b. Show how you could fold a rectangular piece of paper to explain your answer.

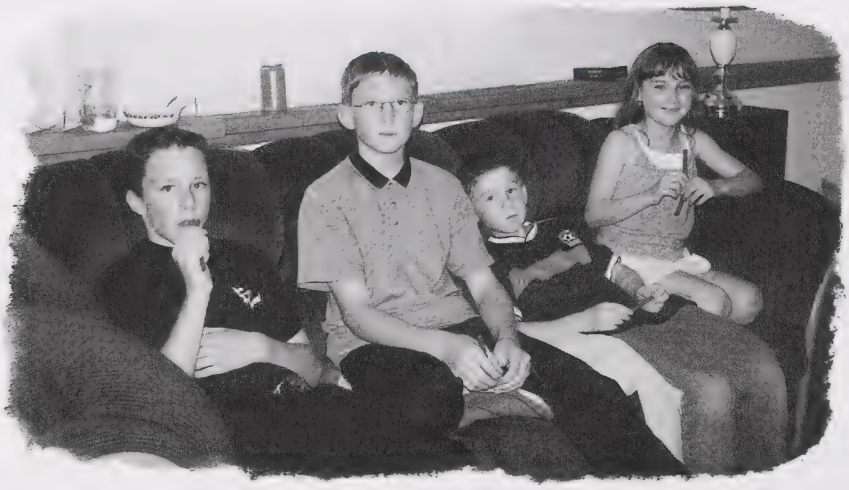
5. Captain Quinn wanted a flag that could be used to identify his ship. He asked the sailors to suggest some designs that they thought would be attractive. Draw pictures of **three** different rectangular flags with the following characteristics:

   - The flag uses two colours: red and blue.
   - The red areas cover $\frac{3}{5}$ of the whole flag.

Check your answers on page 96 in the Appendix.

Activity 3

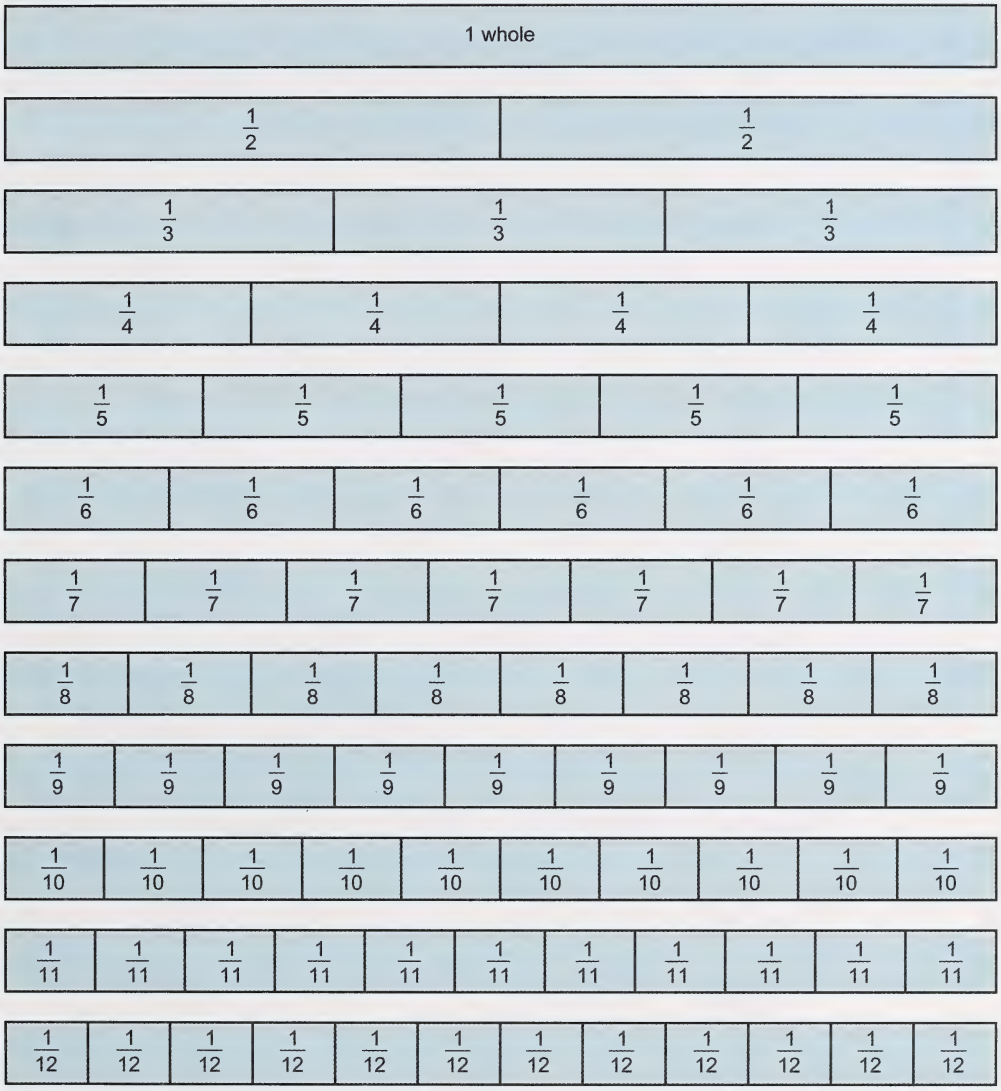
Today you will use equivalent fractions



Do you like black licorice candy? Most Canadian children like red licorice sticks, but only a few like black licorice. In fact, many detest the taste of black licorice. Others say that black licorice is an "acquired" taste.

In this activity, you will use licorice sticks to learn more about equivalent fractions.

The following bars represent licorice sticks.



Suppose you have a whole licorice stick and want to trade it for smaller pieces that are all the same size. Cut a paper strip that is the same length as the whole licorice stick shown above. Place your fraction strip on top of the whole licorice stick. Then slide the strip down the page to find other fractions that are equivalent to 1 whole.

The following number sentence shows the fractions that are equivalent to 1 whole.

$$1 = \frac{2}{2} = \frac{3}{3} = \frac{4}{4} = \frac{5}{5} = \frac{6}{6} = \frac{7}{7} = \frac{8}{8} = \frac{9}{9} = \frac{10}{10} = \frac{11}{11} = \frac{12}{12}$$

This means that you could trade your whole stick for any one of the other sticks, and you would need all the pieces from that stick to equal your whole stick.

1. Suppose you have one-half of a whole licorice stick and want to trade it for the same amount from a different licorice stick. Fold your strip in half. Slide your one-half strip down the bars on page 21, stopping below each of the other bars to find all the licorice sticks that have pieces you can trade for your one-half stick. Write all the equivalent fractions your trade could represent.

2. Suppose you have one-third of a whole stick and want to trade it for the same amount from a different licorice stick. Explain how you can use your paper strip and the bars on page 21 to find all the licorice sticks that have pieces you can trade for your one-third stick. Write all the equivalent fractions your trade could represent.

3. Which licorice sticks on page 21 have pieces that can't be traded for pieces from any of the other sticks on page 21? Explain.

4. For each of the following fractions of a licorice stick, find all the sticks that have pieces you can trade for, and then write the equivalent fractions for each one.

   a. $\frac{2}{3}$ **b.** $\frac{1}{4}$ **c.** $\frac{3}{4}$ **d.** $\frac{1}{5}$ **e.** $\frac{2}{5}$

   f. $\frac{3}{5}$ **g.** $\frac{4}{5}$ **h.** $\frac{1}{6}$ **i.** $\frac{5}{6}$

5. Look for a pattern in each set of equivalent fractions that you wrote in question 4. Describe the pattern.

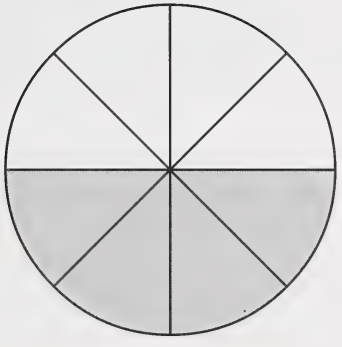
6. Make a rule you can use to find fractions that are equivalent to any fraction you are given.

Check your answers on page 97 in the Appendix.

In order to make a fraction that is equivalent to a given fraction, you must multiply (or divide) both the numerator and the denominator by the same factor.

Example

You can write equivalent fractions to name the shaded part of this circle: $\frac{1}{2}$ and $\frac{4}{8}$.



$\frac{1}{2} \xrightarrow{\times 4} \frac{4}{8}$ $\qquad$ $\frac{4}{8} \xrightarrow{\div 4} \frac{1}{2}$

7. Turn to page 105 of your textbook and answer questions 1 to 3 of Practise Your Skills.

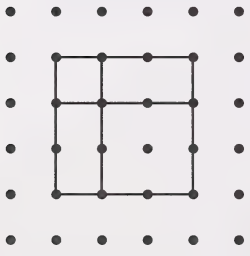
8. Turn to page 50 in the Practice and Homework Book and do questions 1 to 9.

Check your answers on page 98 in the Appendix.

Activity 4

Today you will explore more about the parts of a whole.

Katie made the following squares and rectangles by attaching elastics horizontally and vertically on the pegs of a geoboard.



Notice that the area of the small square is 1 square unit, the area of each rectangle is 2 square units, the area of the medium square is 4 square units, and the area of the large square is 9 square units.

Katie made the following conclusions:

- The small square is $\frac{1}{9}$ of the large square.
- Each rectangle is $\frac{2}{9}$ of the large square.
- The medium square is $\frac{4}{9}$ of the large square.

Katie wrote the following number sentence to show that all the parts of the large square equal the whole.

$$\frac{1}{9}+\frac{2}{9}+\frac{2}{9}+\frac{4}{9}=1$$

1. Turn to page 100 of your textbook and write a number sentence to show all the parts of the first square.

2. Turn to page 46 of the Practice and Homework Book and answer questions 1 and 2.

3. Turn to page 101 of your textbook and answer questions 1 and 2 of On Your Own.

Check your answers on pages 99 and 100 in the Appendix.

Sharing Time

Now it's time to show your home instructor what you have been learning.

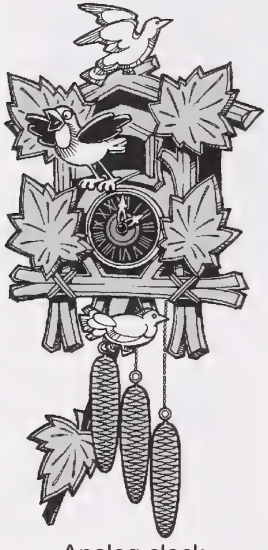
Turn to page 47 of the Practice and Homework Book and complete questions 1 to 4. **Note:** Connect the dots with either vertical or horizontal lines. If you prefer, you can use a geoboard instead of dot paper.

Discuss your answers with your home instructor.

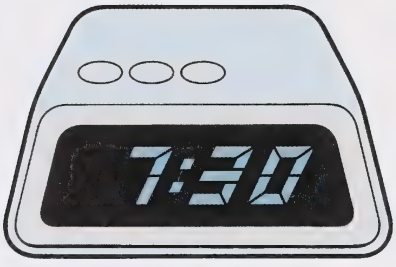
Activity 5

Today you will explore fractions of time.

What kinds of clocks are in your home? What kind of wrist watches do your family members and friends wear? Are the clocks and watches **analog** or **digital**?



Analog clock



Digital clock

People who use analog clocks (clocks with hands) often use fractions when they tell the time. They may say, "half past five" or "quarter past two."

1. How does a digital clock show that it is half past five?

2. How does a digital clock show that it is quarter past two?

Check your answers on page 100 in the Appendix.

There are 60 minutes in 1 hour and 60 seconds in 1 minute. Work through the following examples to discover how you can use equivalent fractions to express minutes as fractions of an hour and vice versa.

Example

Write 20 minutes as a fraction of an hour. Put 20 in the numerator and 60 in the denominator. Express the fraction with the least possible whole number in the denominator.

$$\frac{20}{60} \overset{\div 20}{=} \frac{1}{3}$$

So, 20 minutes is $\frac{1}{3}$ of an hour.

Example

Write $\frac{3}{4}$ of an hour in minutes. Find the numerator for the equivalent fraction that has 60 in the denominator.

$$\frac{3}{4} \overset{\times 15}{=} \frac{45}{60}$$

So, $\frac{3}{4}$ of an hour is 45 minutes.

The same method can be used to express seconds as fractions of a minute and vice versa. Work through the following example.

Example

Write $\frac{1}{6}$ of a minute in seconds. Find the numerator for the equivalent fraction that has 60 in the denominator.

$$\frac{1}{6} \xrightarrow{\times 10} \frac{10}{60}$$

So, $\frac{1}{6}$ of a minute is 10 seconds.

3. Write each of the following as a fraction of an hour.

a. 5 min **b.** 4 min **c.** 6 min

min = minute(s)

4. Write each of the following as a fraction of a minute.

a. 10 s **b.** 36 s **c.** 2 s

s = second(s)

5. Write each of the following in minutes.

a. $\frac{1}{10}$ h **b.** $\frac{4}{5}$ h **c.** $\frac{3}{4}$ h

h = hour(s)

6. Write each of the following in seconds.

a. $\frac{5}{6}$ min **b.** $\frac{1}{5}$ min **c.** $\frac{1}{12}$ min

Check your answers on page 100 in the Appendix.

Going Further

Turn to page 108 in your textbook and read Fractions of Time.

7. Explain why our time system is based on the number 60? In other words, why does an hour have 60 minutes, and why does a minute have 60 seconds?

Check your answer on page 101 in the Appendix.

Challenge Activity

City Cakes is a bakery that specializes in custom cakes. An unusual order came in from Ms. Bizz, the owner of a company celebrating a half-century of business. She ordered five rectangular cakes. She wrote on the order, "I would like to give each of my ten employees one-half of a cake, but I would like each of the five cakes to be cut differently into two equal pieces. Is this possible?"

Experiment by folding or cutting rectangular pieces of paper into two pieces the same size and then shade one piece. Try to find **at least five** different ways.

Explain how you know that each portion is one-half of a whole cake.

Check your answer on pages 101 and 102 in the Appendix.

Conclusion

In this lesson you explored the concept of a fraction as a part of a whole. You also worked with equivalent fractions.

In the introduction to this lesson you discovered that the early Spanish coins were valued by their weight and metal content, not by their face value as they are today. You also discovered why the coins were sometimes referred to as "pieces of eight."

The individual pieces of eight were sometimes called "bits." Thus, two bits of eight were equal to one-fourth of a Spanish dollar. Now you know why even today people sometimes call a quarter "two bits," as in the expression "shave and haircut—two bits."

Turn to Assignment Booklet 3A and complete the Lesson 1 Assignment.

Keep Assignment Booklet 3A until you have completed the entire booklet.

Lesson 2

Fractions as Parts of a Set

What words can you think of to describe specific groups of animals? Did you include any of the following: a *flock* of birds, a *herd* of cattle, a *school* of fish, a *pride* of lions, a *smack* of jellyfish, a *pod* of whales, an *ostentation* of peacocks, an *army* of caterpillars, a *crash* of rhinoceros, or a *murder* of crows?

A general word for a group of things is a **set**. You have heard of a set of dishes, a set of luggage, and a set of golf clubs. You may know of a family that has more than one set of twins. You may have collected a set of baseball cards or a set of beanbag animals.

In this lesson you will review your understanding of using fractions to describe parts of a set. You will also extend your knowledge of equivalent fractions.

Activity 1

Today you will explore fractions as parts of a set.

I gave my "All hands on deck" command. In a moment, a splendid collection of talent assembled for my inspection. I felt honoured to be in command of such a fine crew.

- Captain Quinn

A crew was made up of officers and sailors. The following table lists the number of officers Captain Quinn had on one trip.

Officers	Number
Captain	1
First Mate	1
Second Mate	1
Third Mate	1
Navigator	2
Doctor	2
Total	8

The following table lists the number of sailors for the trip.

Sailors	Number
Cook	2
Crow's-nest Lookout	2
Deck Hand	8
Deck Swabber	6
Cabin Boy	10
Sail Rigger	8
Quartermaster	1
Helmsman	2
Paymaster	1
Total	40

Fractions can be used to compare the size of one part of the crew to a different part. For example, the following fractions show what fraction of the whole crew was made up of officers and what fraction of the whole crew was made up of sailors.

$$\frac{\text{total number of officers}}{\text{total number of crew members}} = \frac{8}{48} \qquad \frac{\text{total number of sailors}}{\text{total number of crew members}} = \frac{40}{48}$$

1. Use as many equivalent fractions as you can to answer each of the following questions.

a. What fraction of the whole crew did the officers represent?
b. What fraction of the whole crew did the sailors represent?
c. What fraction of the sailors did the deck hands represent?
d. What fraction of the sailors did the cabin boys represent?
e. What fraction of the officers did the navigators represent?
f. What fraction of the officers did the captain's first, second, and third mates represent?

Check your answers on page 102 in the Appendix.

You can apply what you have learned about fractions as parts of a set to other situations.

Example

There are 32 pieces on a chessboard, and 16 of these pieces are white. What fraction of the pieces is white? Express the fraction in **simplest form**.

A number is in simplest form when the numerator and the denominator are the least possible whole numbers.

$$\frac{16}{32} \overset{\div 16}{=} \frac{1}{2}$$

On a chessboard, $\frac{1}{2}$ of the pieces are white.

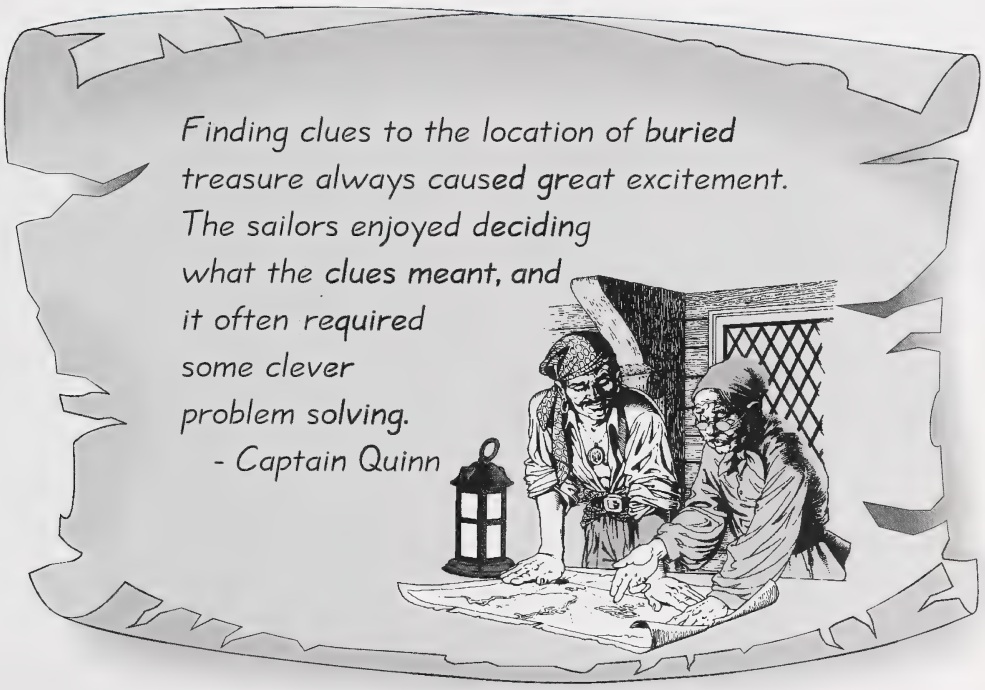
2. Turn to page 107 of the textbook and answer the following questions. Express your answers in simplest form.

   a. What fraction of the egg carton is empty?
   b. What fraction of the crayons in the box is missing?

Check your answers on page 102 in the Appendix.

Activity 2

Today you will continue to explore fractions as parts of a set.


Finding clues to the location of buried treasure always caused great excitement. The sailors enjoyed deciding what the clues meant, and it often required some clever problem solving.
- Captain Quinn

Some of the clues used words as sets of letters. For example, the first third of *clever* (cl) and the middle of *dues* (ue) spell *clue*.

1. Use the following clues to decipher the message.

   a. first fourth of thousand
   b. last three-fifths of skirt
   c. last half of my
   d. first third of filthy
   e. last two-sevenths of believe
   f. middle half of opal
   g. first fourth of call
   h. last two-fifths of roses
   i. second half of Connor
   j. first fifth of thoughtful
   k. the middle half of soft
   l. middle third of smothered
   m. first eighth of painting
   n. first half of almond
   o. the middle two-thirds of street

Message: _____

_____ _____ _____

_____ _____

_____

2. At one location where they found treasure, the exploration team left a note in the empty chest. To write the note like a puzzle, the scribe used parts of words. What parts of the following words could the scribe use to make the clues for the message "We have found the treasure?" An example has been done for you.

	Part of Word Used	Letters in Clue	Word Used
	middle third	we	lowest
a.		h	wash
b.		ave	avenue
c.		fo	affordable
d.		un	sun
e.		d	wording
f.		th	though
g.		e	east
h.		tre	decimetre
i.		as	grasping
j.		ure	future

3. Turn to page 104 in your textbook. The picture at the bottom of the page shows some treasure chests that an exploration team found buried on an island. The sailors shared the treasure chests equally among themselves.

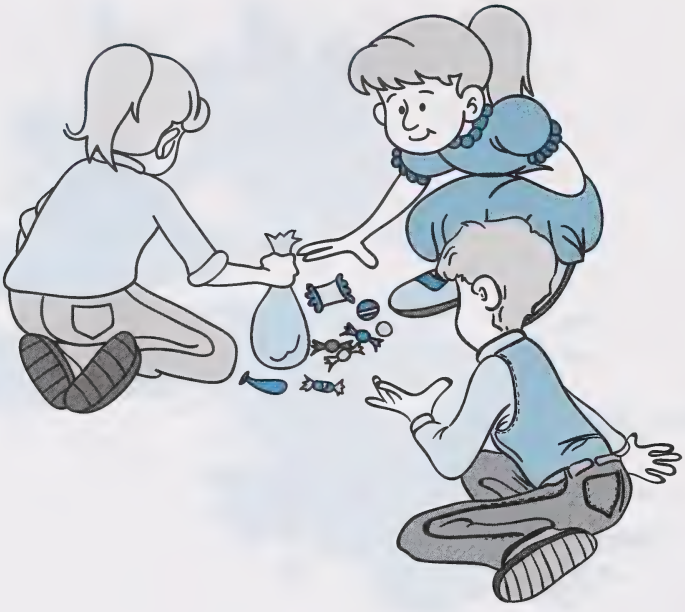
   a. How many different numbers of sailors could have shared the treasure chests? Explain.

   b. For each of the different numbers of sailors possible, tell what fraction of the treasure chests each sailor would have received. Write equivalent fractions where it is appropriate.

Check your answers on page 103 in the Appendix.

Activity 3

Today you will solve problems involving fractions.



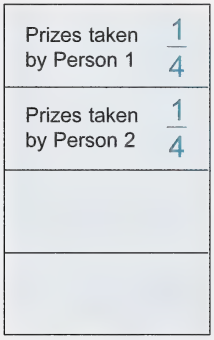
Have you ever gone to a party where there was a grab bag that you picked a prize from?

Turn to page 102 in your textbook and read the problem. Work through the following steps to discover one way to solve the problem.

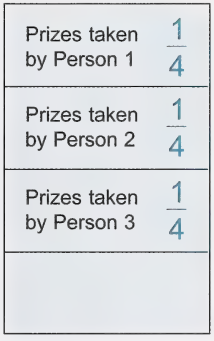
Step 1: If you think of the prizes as being in one whole bag, you could represent the bag as a rectangle.

Step 2: Person 1 takes $\frac{1}{4}$ of the prizes, so divide the rectangle into 4 equal parts. Show Person 1's share on the diagram.

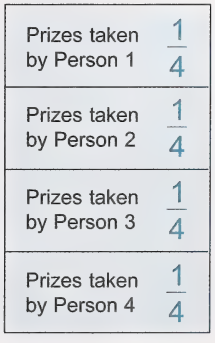
Step 3: Person 2 takes $\frac{1}{3}$ of the prizes that are left, so she takes 1 of the 3 remaining parts. Each of the parts left is $\frac{1}{4}$ of the whole bag, so Person 2 takes $\frac{1}{4}$ of the prizes. Show Person 2's share on the diagram.



Step 4: Person 3 takes $\frac{1}{2}$ of the prizes that are left, so she takes 1 of the 2 remaining parts. Each of the parts left is $\frac{1}{4}$ of the whole bag, so Person 3 takes $\frac{1}{4}$ of the prizes. Show Person 3's share on the diagram.



Step 5: Person 4 takes the prizes that are left. The 1 part left is $\frac{1}{4}$ of the whole bag, so Person 4 takes $\frac{1}{4}$ of the prizes. Show Person 4's share on the diagram.



Step 6: Person 4 took 8 prizes, which represents $\frac{1}{4}$ of the set of prizes. Since each of the other people also got $\frac{1}{4}$ of the set of prizes, the total number of prizes can be found by adding $(8+8+8+8=32)$ or by multiplying $(4\times 8=32)$.

Prizes taken by Person 1	$\frac{1}{4}$
Prizes taken by Person 2	$\frac{1}{4}$
Prizes taken by Person 3	$\frac{1}{4}$
Prizes taken by Person 4	$\frac{1}{4}$

There were 32 prizes in the bag to start.

To check your answer, you may want to put 32 items in a bag and act out the problem.

1. a. Turn to page 103 of your textbook. Do question 1 of On Your Own. Show your work.

b. Will you write the same fraction of the whole box of invitations as each of your friends? Explain.

2. Rohit had a full package of hockey cards that he shared with some of his friends. First, he gave Bill $\frac{1}{3}$ of the cards, and then he gave Gwen $\frac{1}{2}$ of the cards that were left. When Rohit shared the remaining cards with Wayne, they each had 3 cards. Show your work and answer the following questions. Write equivalent fractions where appropriate.

a. How many hockey cards were in the package to begin with?

b. What fraction of the full package of hockey cards did Gwen, Rohit, and Wayne each have?

3. Turn to page 48 in the Practice and Homework Book and answer questions 1 and 2.

Check your answers on pages 104 to 107 in the Appendix.

Sharing Time

Now it's time to share what you have been learning with your home instructor.

Look over the problems in Activity 3. Discuss with your home instructor which problem was the most difficult problem to solve. Explain why.

Challenge Activity

Jenny made a batch of cookies. She gave Elise $\frac{1}{5}$ of the cookies. After she gave Pat and Tim each the same number of cookies, one less than half of the full batch of cookies was left. When she shared the remaining cookies between Jamie and herself, each of them received 2 cookies.

1. How many cookies did Jenny make?

2. What fraction of the whole batch of cookies did each person get?

Check your answers on page 107 in the Appendix.

Conclusion

In this lesson you learned different ways to describe fractions that represent parts of a set. In this lesson you worked with sets of sailors, letters, prizes, cookies, and so on.

Hopefully you now have a better understanding of fractions as parts of a set.

When you think about sets, remember that *set* is simply another word for *group*. If you are working with sets of animals, you may prefer to use some of the interesting words you encountered at the beginning of this lesson.

Turn to Assignment Booklet 3A and complete the Lesson 2 Assignment.

Keep Assignment Booklet 3A until you have completed the entire booklet.

Lesson 3

Connecting Fractions and Decimals

Matthew and Skylar are looking at a globe. They notice that water makes up a large fraction of Earth's surface.

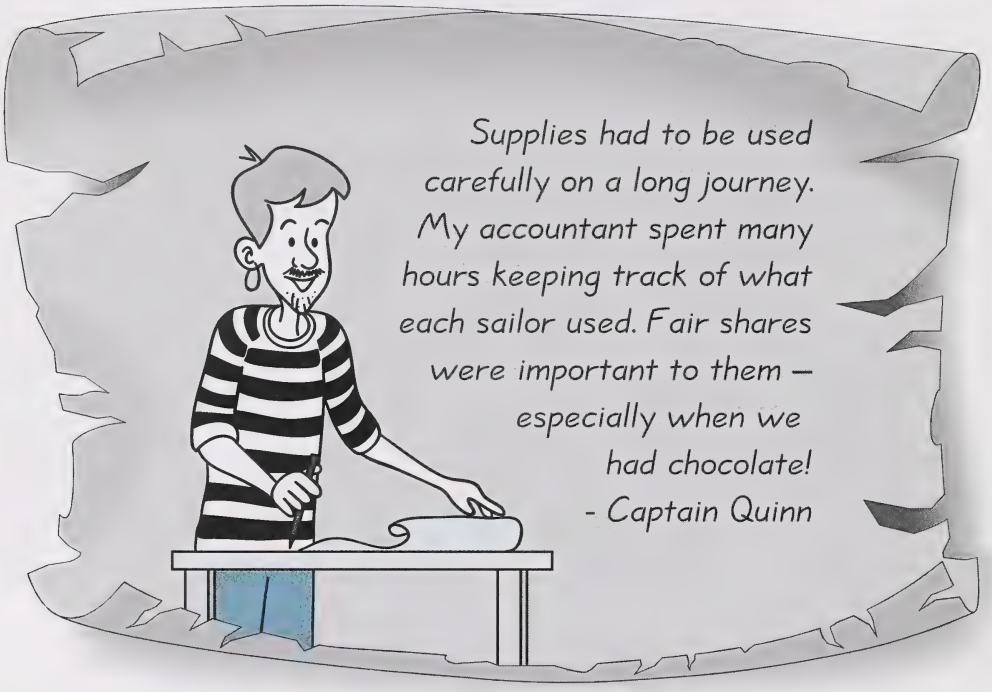
Matthew decides to do some research and discovers that Earth's surface is 0.72 water and 0.28 land. Matthew also found a table that shows the approximate area of the continents as fractions of Earth's total land area.

In this lesson you will learn how decimals and fractions are connected.

Continent	Fraction of Earth's Total Land Area
Africa	$\frac{1}{5}$
Antarctica	$\frac{1}{10}$
Asia	$\frac{3}{10}$
Australia	$\frac{1}{20}$
Europe	$\frac{1}{15}$
North America	$\frac{1}{6}$
South America	$\frac{1}{8}$

Activity 1

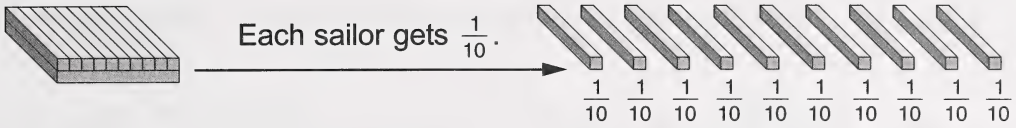
Today you will model fractions with denominators of 10 and 100. You will express these fractions as decimal numbers.


Supplies had to be used carefully on a long journey. My accountant spent many hours keeping track of what each sailor used. Fair shares were important to them – especially when we had chocolate!
- Captain Quinn

The accountant used **decimals** rather than fractions to keep track of supplies because it was easier to tally and compare amounts used by the sailors.

Chocolate was the sailors' favourite treat. It came in large slabs that could be broken into 10 equal pieces, and each of those 10 pieces could be broken into 10 smaller equal pieces.

Suppose a slab of chocolate was to be shared equally by 10 sailors. Use a base ten flat to represent the slab of chocolate. Cover the flat with rods to show that 1 flat is equivalent to 10 rods. The rods show that each sailor would get $\frac{1}{10}$ of the chocolate.



The accountant would record this as 0.1 of a slab of chocolate.

Remember, there are two ways to write one-tenth.

$$\frac{1}{10} = 0.1$$

1. Write the decimal that the accountant would write if a sailor ate

   a. $\frac{3}{10}$ of a slab of chocolate

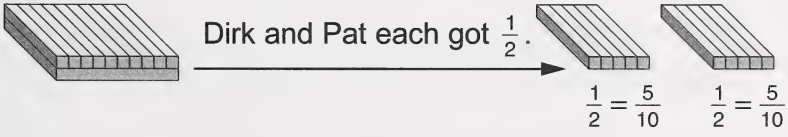
   b. $\frac{7}{10}$ of a slab of chocolate

   c. $\frac{9}{10}$ of a slab of chocolate

2. A **proper fraction** is a fraction whose numerator is less than its denominator. Explain how you can write any proper fraction that has a denominator of 10 as a decimal.

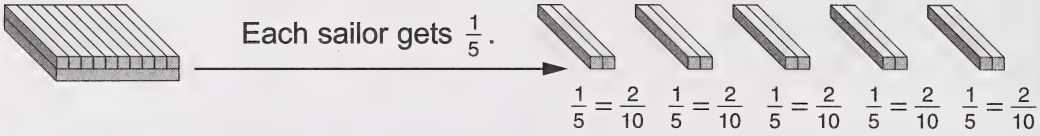
Check your answers on page 108 in the Appendix.

Dirk and Pat reported to the accountant that they had equally shared a slab of chocolate.

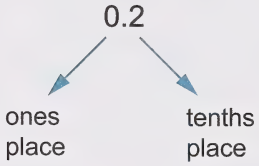


The accountant used equivalent fractions to record shares like this as decimals. The number 10 is a multiple of 2, so $\frac{1}{2} = \frac{5}{10}$. The accountant wrote each of these shares as 0.5.

Five sailors reported to the accountant that they had equally shared a slab of chocolate.



The number 10 is a multiple of 5, so $\frac{1}{5} = \frac{2}{10}$. The accountant wrote each of these shares as 0.2. **Note:** Because there is no whole, only a part, the accountant wrote a zero in the ones place.



3. If a base ten flat represents a slab of chocolate, and two rods represent one-fifth of a slab of chocolate, draw rods that show the following shares. Then show how the accountant would use equivalent fractions to record these shares as decimals.

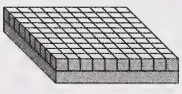
a. two-fifths of a slab of chocolate
b. three-fifths of a slab of chocolate
c. four-fifths of a slab of chocolate

4. a. Explain how you can use equivalent fractions to write any proper fraction that has a denominator of 5 as a decimal.

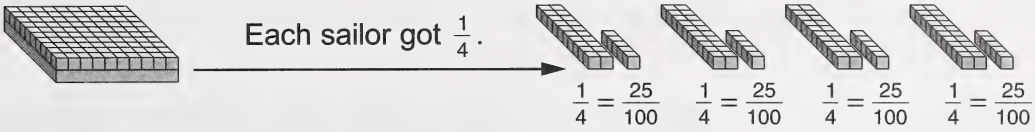
b. Use your rule to write four-fifths as a decimal.

Check your answers on page 108 in the Appendix.

Cover the flat with 100 small cubes to show that 1 flat is equivalent to 100 small cubes.



Four sailors reported to the accountant that they had equally shared a slab of chocolate.



The number 100 is a multiple of 4 because $4 \times 25 = 100$, so $\frac{1}{4} = \frac{25}{100}$. The accountant wrote each of these shares as 0.25. **Note:** You can see from the model that $0.25 = 2$ tenths $+ 5$ hundredths, or 25 hundredths.

Remember, there are two ways to write fractions whose denominators are hundredths.

$$\frac{1}{100} = 0.01$$

5. If a base ten flat represents a slab of chocolate, and 2 rods and 5 small cubes represent one-fourth of a slab, draw base ten blocks that show the following shares.Then show how the accountant would use equivalent fractions to record these shares as decimals.

a. two-fourths **b.** three-fourths

6. Explain how you can use equivalent fractions to write any proper fraction that has a denominator of 4 as a decimal.

7. If you multiply (or divide) both the numerator and denominator of a fraction by the same factor, you can make equivalent fractions. Use this rule to find equivalent fractions that have denominators of 10 or 100, and then write the decimal that represents each of the following.

a. $\frac{29}{50} =$ **b.** $\frac{13}{25} =$ **c.** $\frac{3}{6} =$

d. $\frac{6}{8} =$ **e.** $\frac{12}{20} =$ **f.** $\frac{9}{36} =$

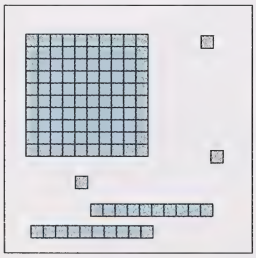
Check your answers on page 109 in the Appendix.

Activity 2

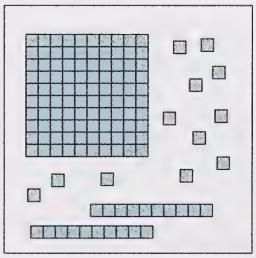
Today you will model fractions with denominators of 100. You will express these fractions as decimal numbers.

In Activity 1 you used a base ten flat to represent one whole, a rod to represent one-tenth of a flat, and a small cube to represent one-hundredth of the flat.

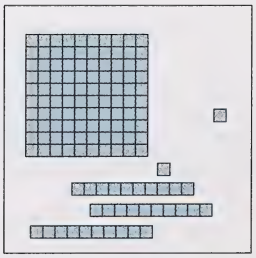
The following pictures show models made by three students who used a base ten flat to represent one whole.



Kirsten



Mike



Chad

1. Which model(s) show 1.32? Explain.

2. If the flat represents one whole, which of these models uses the least number of base ten blocks to show 1.32? Explain.

3. A fourth student, Janice, did not use any flats in her model of 1.32. Draw a picture of which base ten blocks she might have used for her model.

4. Copy and complete the table to show all possible models of 1.32, using the flat as one whole.

Number of Flats	1	1	1						
Number of Rods	3	2	1						
Number of Small Cubes	2	12	22						

Check your answers on pages 109 and 110 in the Appendix.

5. Suppose you chose the large base ten block to represent one whole.

   a. Which block would represent one-tenth?
   b. Which block would represent one-hundredth?

6. Using the large base ten block to represent one whole, draw pictures that show models for each of the following numbers that use the least number of blocks.

   a. 1.25
   b. 1.06
   c. 1.53
   d. 1.4

7. If you used a tens rod to represent one whole, could you use other base ten blocks to represent tenths and hundredths? Explain.

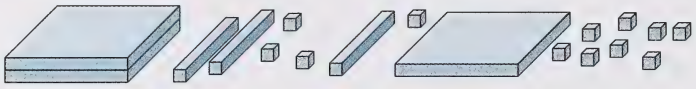
Check your answers on pages 110 and 111 in the Appendix.

As you will recall from your work in Module 1, whole numbers can be written in different ways: in words, in standard form, and in expanded form.

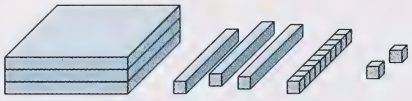
Similarly, decimal fractions can be represented in different ways. Work through the following example.

Example

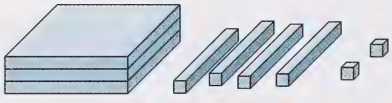
If a flat represents one whole, what does the following model represent?



Step 1: Group all the flats, all the rods, and all the small cubes.



Step 2: Trade 10 small cubes for 1 flat.



Step 3: Write the number in expanded form using place-value words.

3 ones + 4 tenths + 2 hundredths

Step 4: Write the number in expanded form.

$3 + 0.4 + 0.02$

Step 5: Write the number in standard form.

3.42

8. Copy and complete the following tables in your notebook. **Note:** A flat represents one whole.

a.

Base Ten Blocks Used	Flats	Rods	Cubes
Number of Blocks Given	2	13	6
Regrouped Blocks			
Expanded form using place-value words:			
Expanded form:			
Standard form:			

b.

Base Ten Blocks Used	Flats	Rods	Cubes
Number of Blocks Given	0	25	17
Regrouped Blocks			
Expanded form using place-value words:			
Expanded form:			
Standard form:			

c.

Base Ten Blocks Used	Flats	Rods	Cubes
Number of Blocks Given	3	9	11
Regrouped Blocks			
Expanded form using place-value words:			
Expanded form:			
Standard form:			

d.

Base Ten Blocks Used	Flats	Rods	Cubes
Number of Blocks Given	2	7	20
Regrouped Blocks			
Expanded form using place-value words:			
Expanded form:			
Standard form:			

Check your answers on pages 111 and 112 in the Appendix.

Activity 3

Today you will work with decimals in everyday life.

So far in this lesson, you have been learning about the meaning of decimals. Now you will see how important decimals are in your everyday life.

1. The whole unit in Canadian money is the dollar (loonie).

   a. Which coin represents one-tenth of a dollar?
   b. Which coin represents one-hundredth of a dollar?

2. Regroup the following collections of coins to use the least coins possible. Copy and complete the tables in your notebook.

a.

Coins Used	Loonies	Dimes	Pennies
Number of Coins Given	2	27	34
Regrouped Coins			
Total value of coins ($):			

b.

Coins Used	Loonies	Dimes	Pennies
Number of Coins Given	2	2	99
Regrouped Coins			
Total value of coins ($):			

c.

Coins Used	Loonies	Dimes	Pennies
Number of Coins Given	3	38	56
Regrouped Coins			
Total value of coins ($):			

Check your answers on page 112 in the Appendix.

3. **a.** One dollar is what part of $10? Write it as a fraction and as a decimal.

   b. One dime is what part of $10? Write it as a fraction and as a decimal.

4. Lucy kept track of how she spent a total of $10 last week. Copy and complete her table.

	How I Spent My $10	Amount I Spent	Coins	Part of $10 as Fraction and Decimal
a.	**Saturday Movie**		5 loonies	$\frac{5}{10} = 0.5$
b.	**Popcorn**	$2.00	2 loonies	
c.	**Drink**			$\frac{1}{10} = 0.1$
d.	**Bubble Gum**	$0.50	5 dimes	
e.	**Comic Book**		1 loonie and 5 dimes	

5. In January, Kent opened a savings account. Each month he deposited a portion of his allowance. At the end of the year he had saved $100. Write a fraction and a decimal that tells what part of the $100 he saved in each the following months.

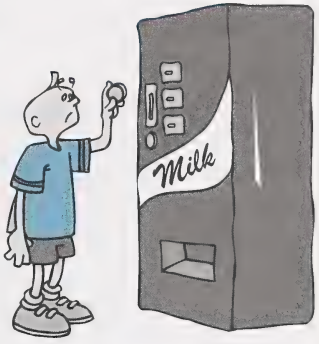
   a. In January, he saved $10.
   b. In April, he saved $4.
   c. In June, he saved $15.
   d. In November, he saved $23.

6. Turn to page 132 in your textbook and read Measuring the World. Then answer questions 1 and 2.

Check your answers on page 113 in the Appendix.

Challenge Activity

Gus wanted to buy some milk from the vending machine. All he had was a loonie, and the machine was unable to make change. Gus asked Linda if she could give him change for his loonie. Linda emptied her pocket and counted her coins. She said, "I'm sorry, Gus. I have more than one dollar in total, but I can't make change for a loonie."



How much money could Linda have had in her pocket?

Check your answer on pages 113 and 114 in the Appendix.

Conclusion

In this lesson you learned how quantities less than one can be represented by fractions and decimals and how these representations are connected.

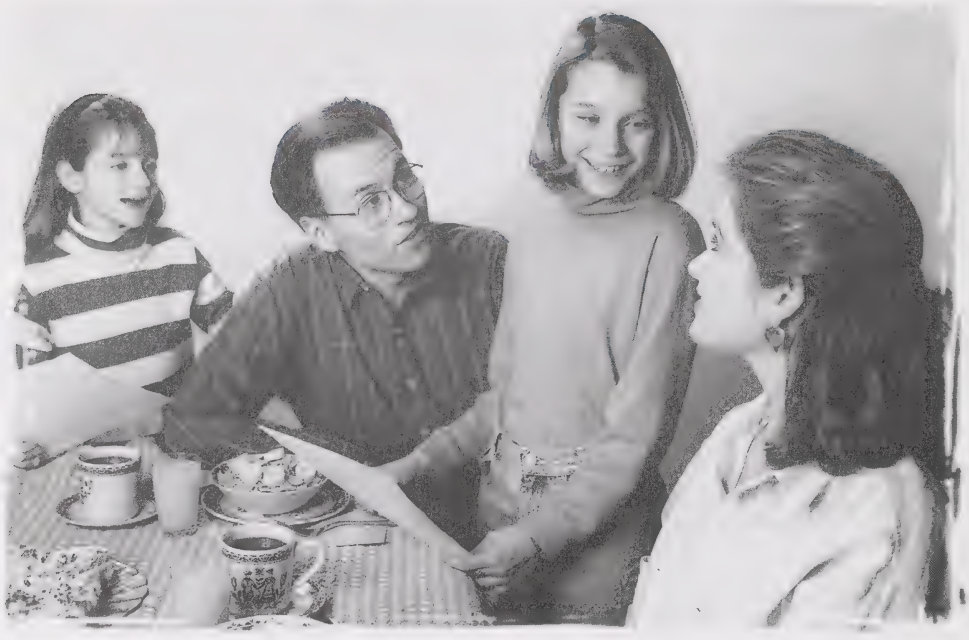
With experience, you will gain a greater number sense for fractions and decimals.

Turn to Assignment Booklet 3A and complete the Lesson 3 Assignment.

When you are done, send Assignment Booklet 3A to your distance learning teacher to be marked.

Lesson 4

Comparing and Ordering Fractions and Decimals



JIM WHITMER PHOTOGRAPHY

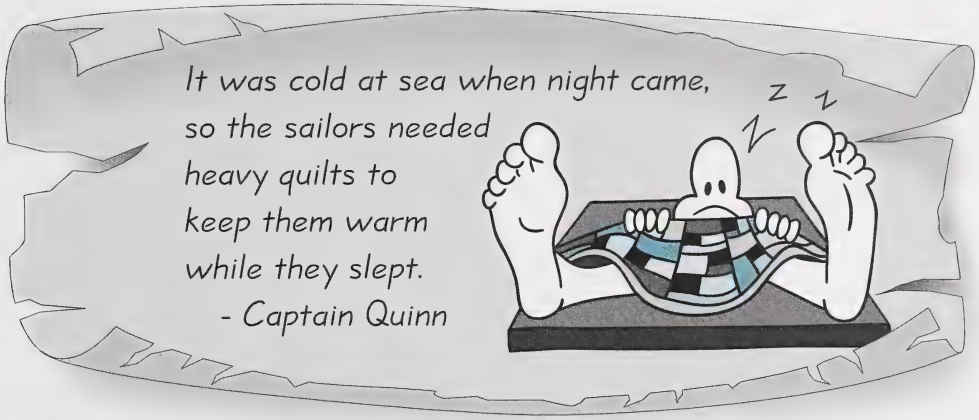
Packages of food usually contain information about the ingredients and nutritional value. This information is very important for people on special diets.

One kind of cereal has 9.1 g of sugar per serving. Another kind of cereal has 15.8 g of sugar per serving. Which kind of cereal has less sugar?

In this lesson you will compare and order fractional parts according to size.

Activity 1

Today you will compare fractions.



1. Turn to page 96 in your textbook to see one of the cozy quilts used by the sailors. Use the picture to answer the following questions.

   a. What fraction of the whole quilt is blue? Write as many equivalent fractions as you can that represent the blue part.

   b. For which colours are there the same number of squares? What fraction of the whole quilt do each of these colours represent? Write as many equivalent fractions as you can for that fraction of the whole quilt.

   c. For which colour are there the least squares? What fraction of the whole quilt does that colour represent? Write as many equivalent fractions as you can for that fraction of the whole quilt.

   d. Which colour have you not yet identified? What fraction of the whole quilt does that colour represent? Write as many equivalent fractions as you can for that fraction of the whole quilt.

   e. What colours in the quilt make up more than one-quarter of it?

2. In your notebook, draw a rectangular quilt that is 5 squares by 6 squares.

3. Show how you can use equivalent fractions to find how many squares of each colour there are in your quilt.

   a. $\frac{1}{10}$ of the quilt is red.

   b. $\frac{1}{5}$ of the quilt is green.

   c. $\frac{1}{15}$ of the quilt is blue.

   d. $\frac{1}{6}$ of the quilt is yellow.

   e. $\frac{1}{3}$ of the quilt is purple.

4. The rest of the squares in your quilt are white.

   a. How many squares are white?
   b. What fraction of the squares are white?

5. Use your answers from questions 3 and 4 to help you order the fractions for all the colours, including white, from least to greatest.

6. Explain how using equivalent fractions can help you order a set of fractions.

7. Using the answers to questions 3 and 4, colour the quilt you drew in question 2. Make any pattern you like!

Check your answers on pages 115 and 116 in the Appendix.

Activity 2

Today you will use a number line to order fractions.

A **proper fraction** is a fraction in which the numerator is less than the denominator.

1. Use the numbers 1, 2, 3, 4, and 5 to write all the proper fractions you can. It is helpful to make numeral cards like the ones in the photograph.

Check your answers on page 116 in the Appendix.

Make copies of the fraction bars on page 21 and use them to model the fractions in question 1.

2. Sort the fractions in question 1 into sets of fractions that have the **same denominator**. Compare the length of the fraction bars for each set.

   a. Write each set of fractions in order using < (the "less than" sign).

   b. Write a rule to order fractions with the same denominator and explain why it works.

3. Sort the fractions in question 1 into sets of fractions that have the **same numerator**. Compare the length of fraction bars for each set.

   a. Write each set of fractions in order using < (the "less than" sign).

   b. Write a rule to order fractions with the same numerator and explain why it works.

4. Compare the length of fraction bars that represent the fractions in question 1, and sort the fractions into two sets—fractions less than $\frac{1}{2}$ and fractions greater than $\frac{1}{2}$.

   a. Write the fractions less than $\frac{1}{2}$. They do not have to be in order.

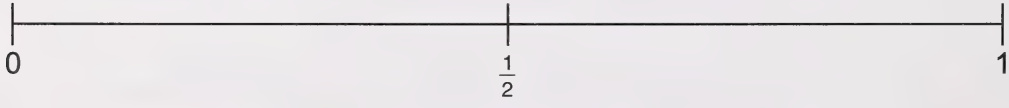
   b. Write the fractions greater than $\frac{1}{2}$. They do not have to be in order.

   c. What rule can you use to decide whether a fraction is less than $\frac{1}{2}$ or greater than $\frac{1}{2}$?

   d. Use your rule to decide if $\frac{4}{7}$ is less than $\frac{1}{2}$ or greater than $\frac{1}{2}$.

Check your answers on pages 116 and 117 in the Appendix.

To order all the fractions in question 1, make a number line like the following. Notice that distance from 0 to 1 is the length of a whole fraction bar.



5. Mark points on your number line for all the fractions in question 1 that are less than $\frac{1}{2}$. Use the fraction bars and the rules you developed in this activity to estimate the position of each fraction on the number line.

6. Mark points on your number line for all the fractions in question 1 that are greater than $\frac{1}{2}$. Use fraction bars and the rules you developed in this activity to estimate the position of each fraction on the number line.

Check your answers on pages 117 and 118 in the Appendix.

Activity 3

Today you will order decimals.

BETTMANN/CORBIS/MAGMA

American Wilma Rudolph was born into a poor family of 22 children. At the age of 4, she was diagnosed with polio, and doctors thought she might never walk again. But Wilma learned to walk with the aid of a metal brace, and at the age of 11, she was finally able to take her first steps without the brace. Five years later, she was in Melbourne, Australia, as part of the relay team that took home the 1956 Olympic bronze medal. Her determination and talent led her back to the 1960 games in Rome, where she became the first American woman to win three gold medals.

1. Turn to page 122 of your textbook and read Starting Out.

   a. Use the information about the women's rowing event to complete a table similar to the one below.

Place	Country	Time
First		
Second		
Third		
Fourth		
Fifth		
Sixth		

   b. Use decimals to describe what a seventh-place finish could have been.

   c. Use decimals to describe a time the fourth-place team would have needed to win the bronze medal (third place).

2. Explain the rules you used to order decimals in question 1.

Check your answers on pages 118 and 119 in the Appendix.

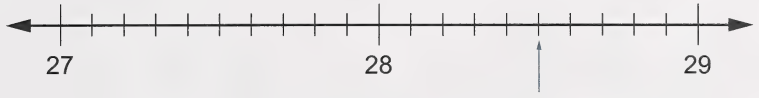
Suppose you wish to order the following measures: 25.5 m, 26.5 m, 27.5 m, and 24 m.

To put the measures in order, it may be helpful to visualize them on a number line.

Therefore, 24 m < 25.5 m < 26.5 m < 27.5 m.

3. Name the decimal shown by each of the arrows. Explain your reasoning.

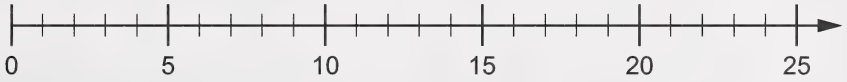
a.



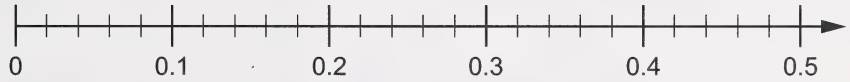
b.

4. Turn to page 124 in your textbook. Read the Nutritional Information given for a particular type of cereal.

a. Place the ingredients that have a mass of more than 1 g on a number line like this:



b. Place the ingredients that have a mass of less than 1 g on a number line like this:



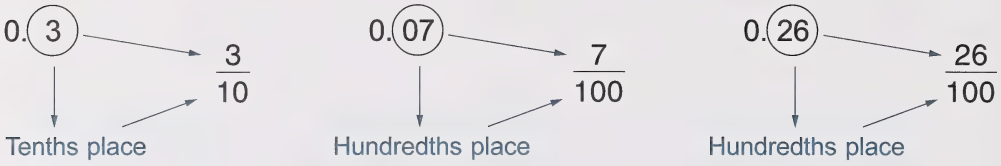
Check your answers on page 119 in the Appendix.

Decimals are like fractions because you can use them to represent parts of a whole or parts of a set. They are like whole numbers because they have place value.

You can think of decimals as fractions with denominators of 10, 100, 1000, and so on. To write a decimal in fraction form, you need to remember these points:

- The place value of the digit furthest to the right tells you what the denominator is.
- The set of digits to the right of the decimal point tells you what the numerator is.

Following are three examples:



5. Explain why it is usually easier to order whole numbers and decimals than it is to order fractions.

6. When is it easy to order a set of fractions?

7. Show how each pair of numbers is related by putting <, =, or > in the boxes.

a. $\frac{1}{4}$ ☐ 0.2 **b.** 0.61 ☐ 0.16 **c.** 0.75 ☐ $\frac{8}{10}$

Check your answers on page 119 in the Appendix.

Sharing Time

Now it's time to show your home instructor what you have been learning.

Turn to page 57 of your Practice and Homework and complete questions 16 to 25. Your home instructor will help you check your answers.

Challenge Activity

Six friends each bought one bag of gumballs. Each bag had 100 gumballs in it. Their favourite flavour was blue, so they wanted to find out who had the most blue candies in their bag.

The following list shows what fraction of each person's bag of candies was blue.

Abe: $\frac{3}{4}$ of a bag	Deepti: 0.7 of a bag
Bianca: 0.6 of a bag	Eli: $\frac{3}{5}$ of a bag
Cindy: $\frac{13}{20}$ of a bag	Fred: 0.35 of a bag

1. List the names in order from who had the most blue candies to who had the least blue candies.

2. Genevieve bought a bag of 50 gumballs. She had a greater fraction of blue gumballs than Cindy, but a smaller fraction of blue gumballs than Deepti. How many of her gumballs could have been blue?

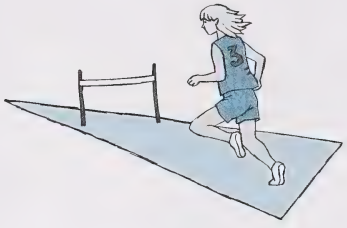
Check your answers on page 120 in the Appendix.

Conclusion

In this lesson you compared and ordered fractions and decimals according to size.

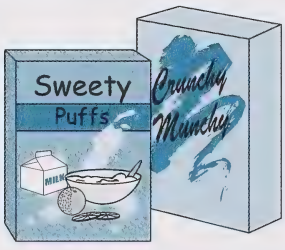
Comparing and ordering are important skills that you will use daily to answer questions like the following:

- Did you run the race in more or less time than your personal best?



- Which plant showed the most growth?

- Which cereal has the highest sugar content?



Turn to Assignment Booklet 3B and complete the Lesson 4 Assignment.

Keep Assignment Booklet 3B until you have completed the entire booklet.

Lesson 5

Adding and Subtracting Decimals

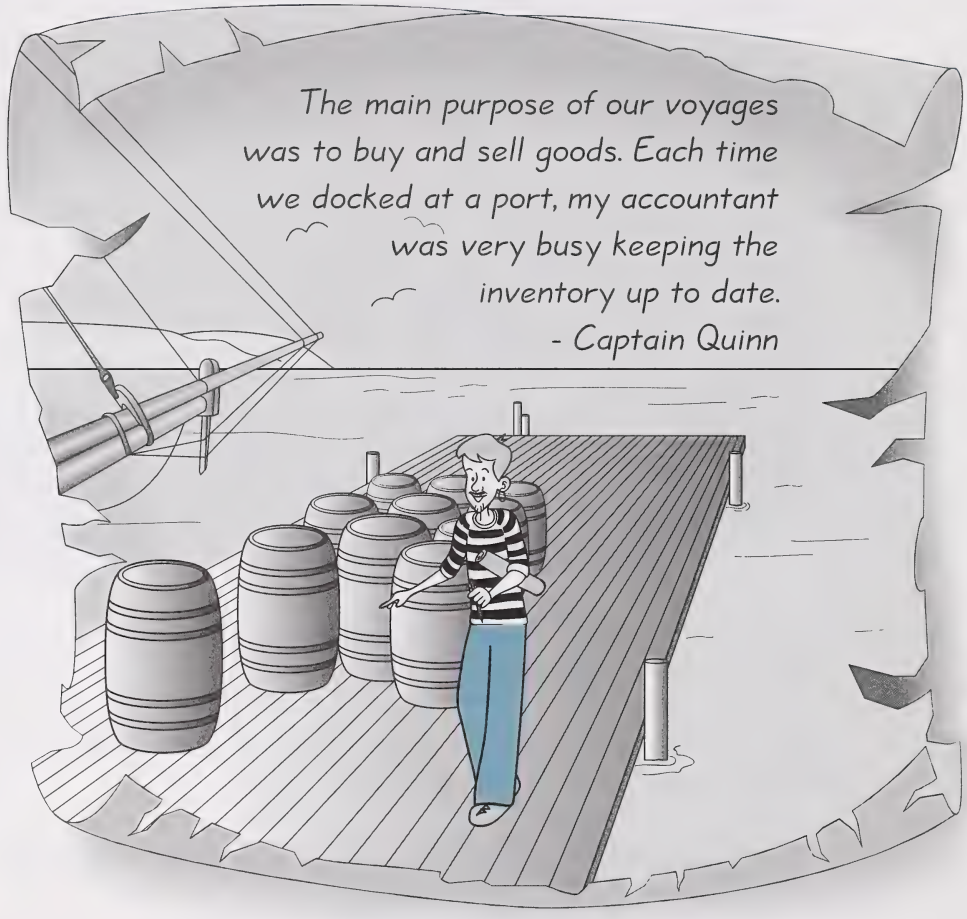
Have you ever been charged too much at a store? Has a clerk ever given you the wrong change?

When you are shopping, it is good practice to estimate the total bill. It is also important to count your change.

In this lesson you will extend your skills with adding and subtracting decimals.

Activity 1

Today you will model the addition and subtraction of decimals. You will also discover how the models and paper-and-pencil methods are related.


The main purpose of our voyages was to buy and sell goods. Each time we docked at a port, my accountant was very busy keeping the inventory up to date.
- Captain Quinn

Dry goods, such as flour, rice, coffee, and tea, were kept in special barrels in the hold to keep them dry. Marks inside the barrels made it easy to check the amount of dry goods in each barrel.

For each of the following problems, let a base ten flat represent each full barrel. Model each problem using base ten blocks. Draw diagrams of the blocks to explain your method. Show a pencil-and-paper method to get the answer.

1. At the beginning of one voyage, there were 8 full barrels of rice. When the ship docked at the first port, there were 5.6 barrels of rice. How many barrels of rice had been used by the time the ship docked at the first port?

2. At the beginning of another voyage, the cook checked the coffee and found that there were 3.75 barrels. When the ship docked at the first port, 2.5 barrels of coffee were purchased. How many barrels of coffee were there when the ship left the first port?

Check your answers on pages 120 to 122 in the Appendix.

For each of the following problems, show your pencil-and-paper method.

3. At the first port, there were 3.65 barrels of tea on hand. At the second port, 2.5 barrels of tea were purchased. At the third port, 1.75 barrels of tea were purchased. If none of the tea was used, how many barrels of tea were on hand when the ship left the third port?

4. Part way through a voyage, there were 4.25 barrels of sugar on hand. At the next port, another 3.5 barrels of sugar were purchased. Before the ship reached home, 2.75 barrels of the sugar were used. How many barrels of sugar were on hand when they arrived home?

5. The cook lost the record telling how many barrels of flour they began their voyage with. However, after loading 12.5 barrels of flour at the first port, the cook saw that there were then 18.25 barrels on hand. If 2 full barrels of flour had been used before arriving at the first port, how many barrels of flour were on hand at the beginning of the voyage?

Check your answers on pages 122 and 123 in the Appendix.

Activity 2

Today you will explore different strategies for adding and subtracting decimals. You will also check your work.

Addition and subtraction are called **inverse operations** because one operation can undo what the other one does.

Example

$$\begin{array}{r} 5.81 \\ -\ 2.75 \\ \hline 3.06 \\ +\ 2.75 \\ \hline 5.81 \end{array} \qquad \text{or} \qquad \begin{array}{r} 3.69 \\ +\ 5.83 \\ \hline 9.52 \\ -\ 5.83 \\ \hline 3.69 \end{array}$$

Turn to pages 155 and 159 of the Practice and Homework Book and study the strategies that are shown.

Then turn to page 129 of your textbook. Use the strategy of your choice to do questions 1, 2, 3, 10, 11, and 12 of Practise Your Skills. First, show how you estimated each answer, and then show your paper-and-pencil work. Use inverse operations to check your answers.

Check your answers on pages 123 and 124 in the Appendix.

Activity 3

Today you will add and subtract decimals.

Turn to page 128 in your textbook. Use the menu shown in Adding and Subtracting Decimals to answer the following questions. Use mental math, pencil and paper, or your calculator to do your computation. Estimate the answers and use mental math as often as you can to get the exact answer.

1. If you had $12 and you wanted one hot dish, one salad, and a sundae, show all the different lunches you could order. Make a chart to organize and show your work.

2. What is the least expensive lunch you could order if you wanted one soup, one sandwich, a beverage, and a dessert? How much does it cost?

3. What is the most expensive lunch that could be ordered if someone wanted one salad, one hot dish, a beverage, and a dessert? How much does it cost?

4. How much change would you receive from $10 if you ordered a tuna salad, a chicken burrito, fruit salad, and juice.

5. You ordered a sandwich and a dessert. Your bill was $6.94. What items did you buy? Make a chart to organize and show your work.

6. You and a friend ordered a different hot dish and a different beverage for lunch. Your bills were both $7.20. What items might you and your friend have ordered? List all the possible lunch combinations.

Check your answers on pages 125 and 126 in the Appendix.

7. Turn to page 60 of the Practice and Homework Book and answer question 1.

Check your answer on page 127 in the Appendix.

Sharing Time

Turn to page 61 of the Practice and Homework Book. Ask your home instructor, friends, or family members to help you complete this page.

Discuss the answers.

Challenge Activity

1. Together, Tory, Cary, and Zeb saved $35.00. Tory saved $1.25 more than Zeb, but he saved $2.50 less than Cary. How much did each of them save?

2. Turn to page 62 of the Practice and Homework Book and answer question 1.

Check your answers on page 127 in the Appendix.

Conclusion

In this lesson you developed paper-and-pencil methods to add and subtract decimals, and then used them to solve problems.

Turn to Assignment Booklet 3B and complete the Lesson 5 Assignment.

Keep Assignment Booklet 3B until you have completed the entire booklet.

Lesson 6

Multiplying and Dividing Decimals

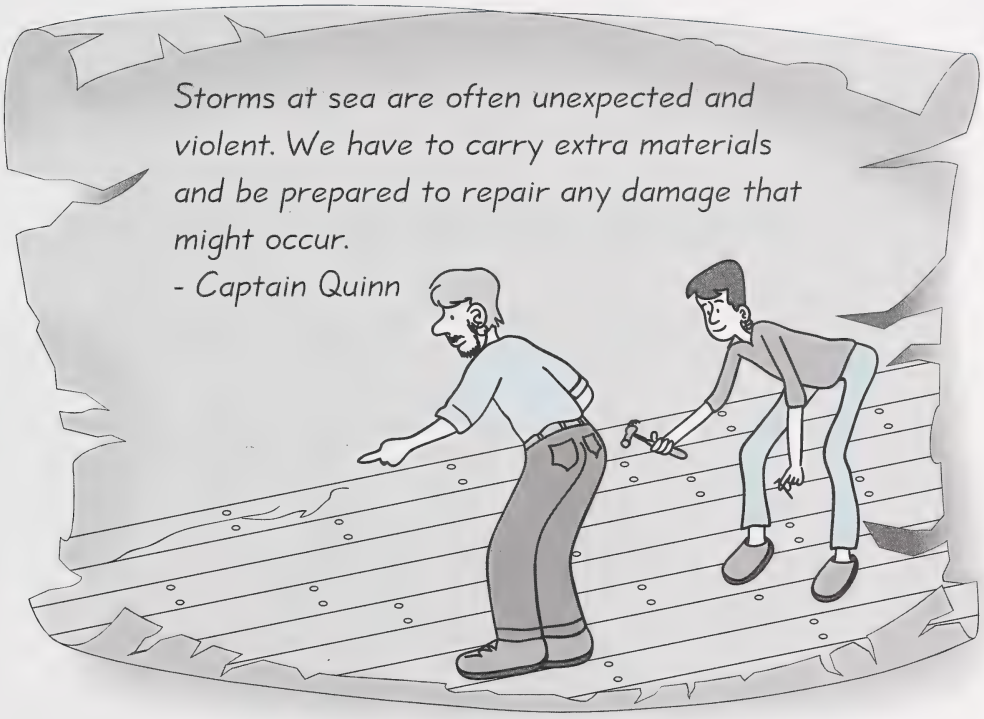
A pack of bubble gum costs $0.79. How much would 3 packs cost? If you have $5, how many packs can you buy? How much change would you have left over?

To answer these questions you must be able to multiply and divide decimals.

In this lesson you will model these operations and develop paper-and-pencil strategies.

Activity 1

Today you will review multiplying a decimal number (limit tenths) by a whole number.


Storms at sea are often unexpected and violent. We have to carry extra materials and be prepared to repair any damage that might occur.
- Captain Quinn

The ship's decks were made of wooden planks of various lengths, and so extra planks were carried in the hold for emergencies. To repair damage to the deck caused by one storm, the carpenter determined that 3 planks, each 2.1 m long, were required. He found a 7-m plank in the hold, and he wondered if he could cut the 3 shorter planks from it.

1. **a.** If you use one base ten rod to represent 1 m, which base ten block will you use to represent 0.1 m?

   b. What unit of length is 0.1 m?

2. **a.** Use base ten blocks to represent the three 2.1-m planks. Draw a picture of your models.

b. The carpenter wanted to know the total length of the three 2.1-m planks. To represent the sum of three 2.1-m planks, combine all the rods, and then combine all the small cubes. Draw a picture to show your work.

c. Record your steps to show a pencil-and-paper method for multiplying 3×2.1.

d. Can the carpenter cut the shorter planks from the 7-m plank? Explain why or why not.

Check your answers on page 128 in the Appendix.

For a different repair the carpenter needs 5 planks, each 1.3 m in length, cut from a 7-m plank.

3. a. Draw a picture to show how you can use base ten blocks to represent five 1.3-m planks.

b. To represent the sum of the five 1.3-m planks, combine all the rods and all the small cubes. Draw a picture to show your work.

c. Regroup the small cubes to make rods where possible. How many rods and how many small cubes represent the sum of the five 1.3-m planks? Draw a picture to show your work.

d. Record your steps to show a pencil-and-paper method for multiplying 5×1.3.

e. Can the carpenter cut the five shorter planks from the 7-m plank? Explain why or why not.

Check your answers on pages 128 and 129 in the Appendix.

Activity 2

Today you will multiply a decimal number (limit hundredths) by a whole number.

If one hair ribbon costs $1.23. How much will 5 ribbons cost?

You can use the following steps to visualize and solve this problem.

Step 1: Model 5×1.23 with coins.

The ribbons cost $6.15.

Step 2: Record the process using this paper-and-pencil method.

$$\begin{array}{rr} & 1.23 \\ & \times \quad 5 \\ \hline 5 \times 0.03 = & 0.15 \\ 5 \times 0.20 = & 1.00 \\ 5 \times 1 = & 5 \\ \hline & 6.15 \end{array}$$

The ribbons cost $6.15.

1. Use pictures of coins and a paper-and-pencil method for the following.

   a. the cost of 3 candies at $0.14 each
   b. the cost of 3 watermelons at $2.25 each

Check your answers on page 129 in the Appendix.

Turn to page 163 of the Practice and Homework Book and study the given strategies.

2. Turn to page 64 of the Practice and Homework Book and complete questions 1 and 2.

Check your answers on page 130 in the Appendix.

Activity 3

Today you will divide decimals.

A total of $285.72 was collected by a soccer team to be used for 6 tournaments. If the money is divided equally, what amount can be used for each of the tournaments?

First, you can estimate the answer as follows: $285.72 is about $300, and $300 \div 6 = 50$, so about $50 can be spent on each of the 6 tournaments.

Next, you can use pictures of money to model the problem. Begin with 2 hundred-dollar bills, 8 ten-dollar bills, 5 loonies, 7 dimes, and 2 pennies.

To find the amount of money that can be used for each of the tournaments will take several steps. As you work through the following steps, notice how the steps in the model compare to the paper-and-pencil method.

Model	Paper-and-Pencil Method
Step 1: To find the amount that can be used for each tournament, you need to divide the play money into 6 equal piles. Begin with the hundred-dollar bills. Since you only have 2, you will need to trade them for 20 ten-dollar bills. This gives you a total of 28 ten-dollar bills. You can put 4 ten-dollar bills in each of the 6 piles. You will have 4 ten-dollar bills left over. (In addition, you have 5 loonies, 7 dimes, and 2 pennies to work with.)	$6\overline{)285.72}$ 24 4
Step 2: Trade the 4 ten-dollar bills for 40 loonies. This gives you a total of 45 loonies.	$6\overline{)285.72}$ $24\downarrow$ 45
Step 3: Put 7 loonies in each of the 6 piles. This uses 42 loonies, and 3 loonies are left over. (In addition to the 3 loonies, you have 7 dimes and 2 pennies.)	$6\overline{)285.72}$ $24\downarrow$ 45 42 3
Step 4: Trade the 3 loonies for 30 dimes. This gives you a total of 37 dimes.	$6\overline{)285.72}$ $24\downarrow$ 45 $42\downarrow$ 37

Model	Paper-and-Pencil Method
Step 5: Put 6 dimes in each of the 6 piles. This uses 36 dimes and 1 dime is left over. (In addition, you have 2 pennies.)	47.6 6)285.72 24 45 42 3 7 3 6 1
Step 6: Trade the 1 dime for 10 pennies. You now have a total of 12 pennies to work with.	47.6 6)285.72 24 45 42 3 7 3 6 12
Step 7: Put 2 pennies in each of the 6 piles. This uses all the pennies. There is now a total of \$47.62 in each of the piles. This amount is close to the estimate of \$50.	47.62 6)285.72 24 45 42 3 7 3 6 12 12 0

The amount that can be used for each tournament is \$47.62.

1. Use pictures of money to solve the following problem.

   Danielle has $12.85 to buy 3 gifts. She wants to spend the same amount on each gift. How much can she spend on each gift?

   a. Show how you would estimate the answer.

   b. Use a paper-and-pencil method to solve the problem. Show why the paper-and-pencil method works by drawing pictures of your model.

Check your answers on pages 130 and 131 in the Appendix.

Turn to page 167 of the Practice and Homework Book and study the given strategies.

2. Turn to page 134 in your textbook. Do question 4 at the top of the page. For each problem, explain how you would estimate the answer, and then show your work for solving each problem. Use any method you wish.

3. Turn to page 64 of the Practice and Homework Book and answer questions 4 and 6.

Check your answers on pages 132 and 133 in the Appendix.

Sharing Time

Now it's time to show your home instructor what you have been learning.

Turn to page 65 of the Homework and Practice Book and complete questions 1, 2, 6, and 7.

Your home instructor will help you check your answers.

Activity 4

Today you will solve problems with money.

Turn to page 130 in your textbook. Do questions 1 to 5 of Solving Problems with Money. For each problem, explain how you would estimate the answer, and then show your work. Use any method you wish.

Check your answers on pages 134 to 136 in the Appendix.

Challenge Activity

Dan baby-sits to make extra money. He charges $3.50 for each hour before midnight and $5.25 for each hour after midnight. When he baby-sat for his neighbours on Saturday evening, he earned $24.50. What time did Dan began baby-sitting and what time did he finish?

Check your answer on page 136 in the Appendix.

Conclusion

In this lesson you learned different methods to multiply and divide decimals and used them to solve problems like the following.

Chocolate bars cost $0.89. But when you buy 3 bars, you will get 1 free. You have $5.00. If you spend all your money, how many chocolate bars can you buy?

Turn to Assignment Booklet 3B and complete the Lesson 6 Assignment.

Keep Assignment Booklet 3B until you have completed the entire booklet.

Module Summary

In Module 3 you extended your understanding of fractions and decimals. You learned to find equivalent fractions, and used them to compare and order fractions and decimals. You solved problems by adding, subtracting, multiplying, and dividing decimals.

If Teena and Rob share a pizza that costs $15.98, how much is each person's share of the bill?

Turn to Assignment Booklet 3B and complete the Numbers in the News project.

When you are done, send Assignment Booklet 3B to your distance learning teacher to be marked.

Keystrokes

Take out your calculator and complete the following exercises. They will help you review some of the ideas you have learned in Module 3.

Funky Feature: Constant Divisors

If you need to divide several different numbers by the same divisor, you only need to enter the divisor once, and then you can use it over and over without re-entering it.

One of the two following methods should work on your calculator:

- Divide any number by 2. Then, you can enter any other number you wish to divide by 2 and press the = key.

Keystrokes	ON/C	6	÷	2	=	10	=	8	=	20	=	100	=
Display	0	6	6	2	3	10	5	8	4	20	10	100	50

- Enter the divisor you want and press the ÷ key twice. Then, you can enter any number you wish to divide by 2 and press the = key.

Keystrokes	ON/C	2	÷	÷	6	=	8	=	20	=	100	=
Display	0	2	2	2	6	3	8	4	20	10	100	50

1. Use the constant divisor to find all possible numerators for each of the following fractions. A sample answer is shown.

$$0.65 < \frac{?}{7} < 0.9$$

Keystrokes	ON/C	4	÷	7	=	5	=	6	=
Display	0	4	4	7	0.5714285	5	0.7142857	6	0.8571428

Therefore, the numerator could be 5 or 6.

a. $0.43 < \frac{?}{8} < 0.65$

b. $0.05 < \frac{?}{12} < 0.5$

c. $0.7 < \frac{?}{6} < 0.9$

d. $0.6 < \frac{?}{18} < 0.75$

e. $0.3 < \frac{?}{24} < 0.7$

Check your answers on page 137 in the Appendix.

Funky Feature: Decimals Count, Too!

In Module 2 you used your calculator to count by whole numbers. You can use the same feature to count by decimals.

Example

Enter 4.6 and count by 0.01.

Before you press the = key each time, say the next number that will be displayed.

Keystrokes	ON/C	4.6	+	0.01	=	=	=	=	=	=
Display	0	4.6	4.6	0.01	4.61	4.62	4.63	4.64	4.65	4.66

2. **a.** Enter 6.4 and count by 0.01 to 6.48.

   b. Enter 5.05 and count by 0.1 to 5.85.

   c. Enter 3.16 and count by 0.02 to 3.32.

   d. Enter 10.7 and count by 0.5 to 14.7.

   e. Enter 43.7 and count backward by 0.01 to 43.63. (Enter − instead of + .)

Check your answers on page 137 in the Appendix.

Funky Feature: Place-Value Magic

Enter 3.28. Using only one addition or subtraction operation, change the 2 to a 0.

Keystrokes	ON/C	3.28	−	0.2	=
Display	0	3.28	3.28	0.2	3.08

3. **a.** Enter 1.19. Use only one operation to make the 9 disappear.

   b. Enter 7.84. Use only one operation to change the 7 to a zero.

   c. Enter 4.03. Use only one operation to change the 3 to a 5.

   d. Enter 2.53. Use only one operation to change all the digits to 5s.

   e. Enter 7.24. Use only one operation to decrease both the tenths and hundredths digits by 1.

   f. **Challenge:** Enter 5.86. Use only one operation to switch the ones digit and the tens digit.

Check your answers on page 137 in the Appendix.

Review

This review will help you apply what you learned in Module 3 and prepare for the final test. Discuss with your home instructor when you should begin the Review and how much of the Review you should complete.

1. Turn to page 116 of your textbook. Do questions 1 to 6 of Skill Bank from This Unit.

2. If you had difficulty with the problems in question 1, look back at Lessons 1 and 2, where you learned about fractions as part of a whole, fractions as part of a set, and equivalent fractions. If you feel you need more practice, do questions 4 and 5 of Skill Bank Looking Back on page 145 of your textbook.

Check your answers on page 138 in the Appendix.

3. Turn to page 144 of your textbook. Do questions 1 to 3 of Skill Bank from This Unit.

4. If you had difficulty with questions 1 to 3 of Skill Bank from This Unit, look back at Lessons 3 and 4, where you learned about writing and ordering decimals. If you feel you need more practice, do questions 1 to 9 of Practise Your Skill on page 127 of your textbook.

Check your answers on page 139 in the Appendix.

5. Turn to page 144 of your textbook. Do the following questions from Skill Bank from This Unit

   a. questions 4.a. to 4.d.
   b. questions 5.a. to 5.d.
   c. questions 6.a. to 6.d.

6. If you had difficulty with question 4 of Skill Bank from This Unit, look back at Lesson 5, where you learned about adding and subtracting decimals. If feel you need more practice, do questions 4.e. to 4.h. of Skill Bank from This Unit on page 144 of your textbook.

   If you need help with questions 5 and 6 of Skill Bank from This Unit, look back at Lesson 5, where you learned about multiplying and dividing decimals.

   If feel you need more practice, do questions 5.e. to 5.l. and 6.e. to 6.h. of Skill Bank from This Unit on page 144 of your textbook.

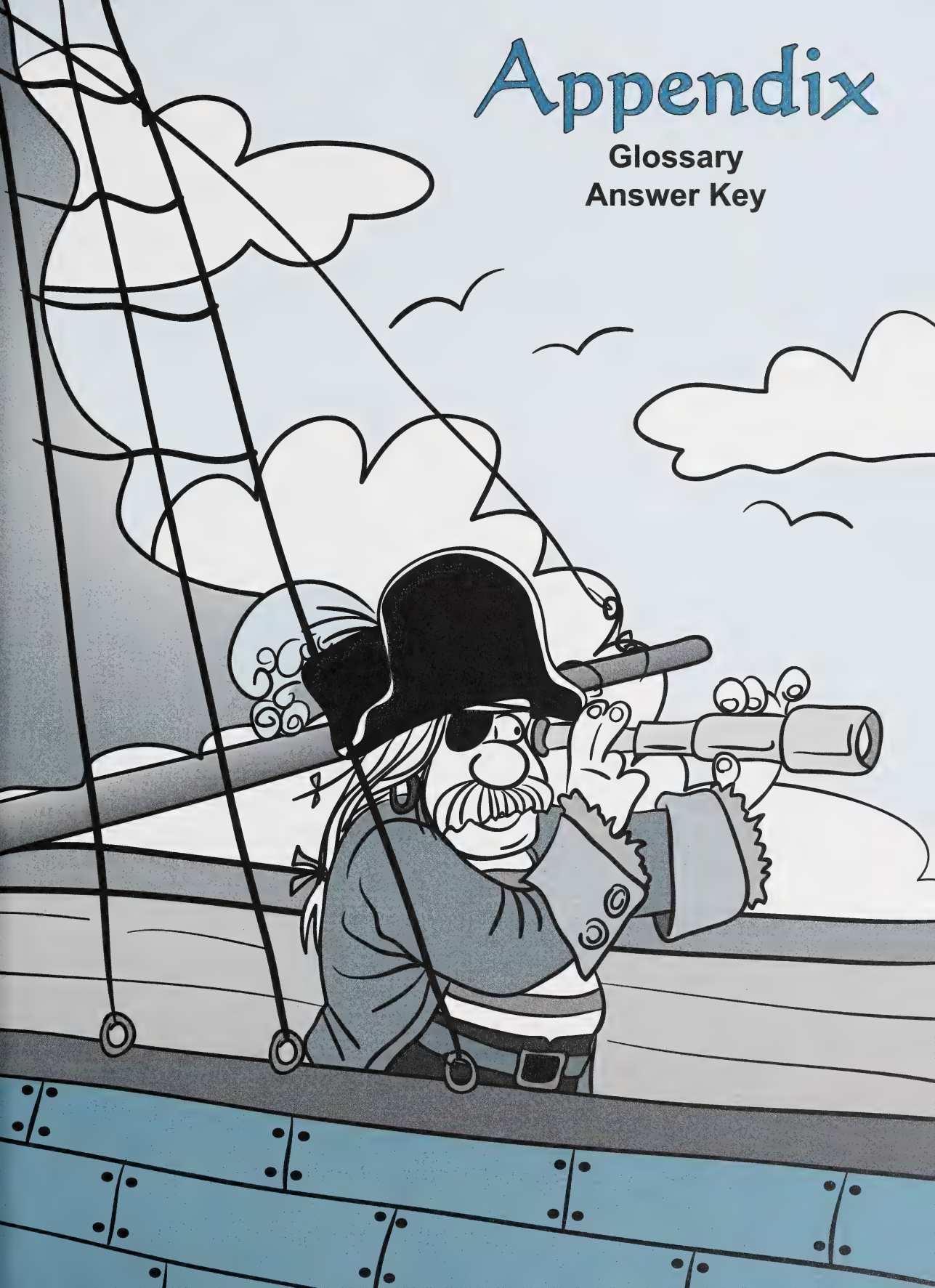
Check your answers on pages 139 and 140 in the Appendix.

7. Turn to pages 112 to 115 of your textbook. For the following questions from Problem Bank, you can make some choices about which problems you would like to solve. Show your work for solving each problem.

   a. Page 112 , Problem Bank, question 1 or 4
   b. Page 112, Problem Bank, question 2 or 3
   c. Page 113, Problem Bank, question 6 or 7
   d. Page 113, Problem Bank, question 8
   e. Page 114, Problem Bank, question 9
   f. Page 115, Problem Bank, question 10

8. If you feel you need more practice solving problems, try the ones in question 7 that you didn't do.

Check your answers on pages 140 to 143 in the Appendix.



Appendix

Glossary
Answer Key

Glossary

denominator: in a fraction, the bottom numeral that tells the number of equal parts in the whole

numerator: in a fraction, the top numeral that tells how many parts are being considered

proper fraction: a fraction in which the denominator is greater than the numerator

simplest form of a fraction: the form in which the numerator and denominator are the least whole numbers possible

Answer Key

Lesson 1: Fractions as Parts of a Whole

Activity 1

1. a. The flag for the letter Z is $\frac{1}{4}$ black.

b. The denominator, 4, tells that the flag is divided into 4 equal parts. The numerator, 1, tells that 1 of the parts is black.

2. a. The flag for the letter C is $\frac{2}{5}$ blue.

b. The denominator, 5, tells that the flag is divided into 5 equal parts. The numerator, 2, tells that 2 of the parts are blue.

3. The flag for the letter T is $\frac{1}{3}$ blue.

4. The flag for the letter E is $\frac{1}{2}$ blue and $\frac{1}{2}$ red.

5. a. The flag for the letter J is $\frac{1}{3}$ white.

b. The flag for the letter T shows the same fraction of white as the flag for the letter J.

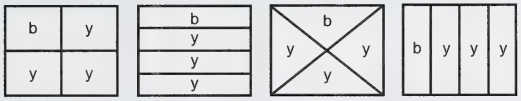
c. Both flags are the same size and both are divided into 3 equal parts. One of the 3 parts on each flag is white. Thus, the white areas on these two flags must be the same size.

6. **a.** The flag for the letter H is $\frac{1}{2}$ red.

   b. The flags for the letters E and O are divided into the same number of parts as the flag for the letter H, and they show the same fraction of red as the flag for the letter H.

7. The flag for the letter D is not $\frac{1}{3}$ blue. It is divided into 3 parts and one of them is blue, but the parts are not equal in size.

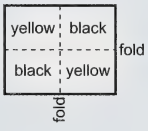
8. Some sample answers are given.



Activity 2

1. **a.** Kassidy might use the fractions $\frac{2}{4}$ and $\frac{1}{2}$ to describe the black area on the flag for the letter L.

   b.

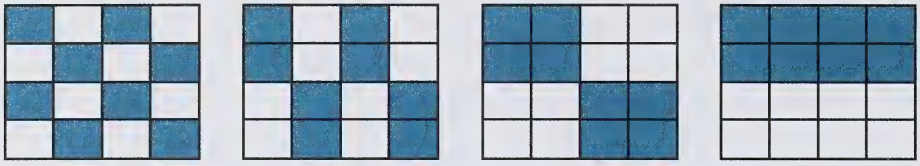


   c. When you make the folds, you can see that the flag is divided into four areas that are the same size. Two of the four areas $\left(\frac{2}{4}\right)$ of the flag are yellow, and two of the four areas $\left(\frac{2}{4}\right)$ of the flag are black. When you make either one of the folds, the black areas match the yellow areas. That means that each yellow area is the same size as each black area, so each colour must cover one-half $\left(\frac{1}{2}\right)$ of the flag.

   d. The flag for the letter U uses the same four areas but has different colours.

2. a. Equivalent fractions you could use to describe the blue area on the flag for the letter N are $\frac{8}{16}$, $\frac{4}{8}$, $\frac{2}{4}$, and $\frac{1}{2}$.

b. You can fold a rectangular piece of paper in half horizontally twice, fold it in half vertically twice, and then open it up. The flag is then divided into 16 areas that are the same size. Because the areas are equal, you can regroup the blue and white areas to illustrate the following equivalent fractions.



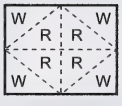
$\frac{8}{16}$ $\frac{4}{8}$ $\frac{2}{4}$ $\frac{1}{2}$

3. a. The fraction $\frac{3}{6}$ describes the blue area on the flag for the letter G.

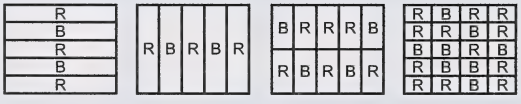
b. $\frac{3}{6} = \frac{1}{2}$

4. a. One-half of the area on the flag for F is red.

b. Fold a rectangular piece of paper once horizontally, once vertically, and then once on the diagonal. When you open it up, you will see eight equal triangular areas. Four of these triangular areas are red and four are white.



5. Some sample answers are given.



$\frac{3}{5}$ $\frac{3}{5}$ $\frac{6}{10} = \frac{3}{5}$ $\frac{12}{20} = \frac{3}{5}$

Activity 3

1. You could trade your one-half stick with pieces from the sticks broken into fourths, sixths, eighths, tenths, and twelfths. You could trade your one-half stick for these fractions of a stick: $\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8} = \frac{5}{10} = \frac{6}{12}$.

2. Fold the strip into three equal parts. Show that each part is equivalent to one of the one-thirds bars. Slide the one-third strip down under each of the other bars on the chart to find fractions that are equivalent to it: $\frac{1}{3} = \frac{2}{6} = \frac{3}{9} = \frac{4}{12}$.

3. The licorice sticks that are divided into sevenths and eleventhths do not have pieces that are equivalent to any number of pieces from any one of the other sticks shown.

4. The equivalent fractions that can be shown with the licorice stick are:

   a. $\frac{2}{3} = \frac{4}{6} = \frac{6}{9} = \frac{8}{12}$ **b.** $\frac{1}{4} = \frac{2}{8} = \frac{3}{12}$ **c.** $\frac{3}{4} = \frac{6}{8} = \frac{9}{12}$

   d. $\frac{1}{5} = \frac{2}{10}$ **e.** $\frac{2}{5} = \frac{4}{10}$ **f.** $\frac{3}{5} = \frac{6}{10}$

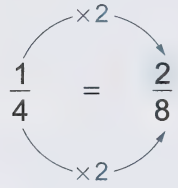
   g. $\frac{4}{5} = \frac{8}{10}$ **h.** $\frac{1}{6} = \frac{2}{12}$ **i.** $\frac{5}{6} = \frac{10}{12}$

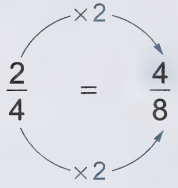
5. For each set, the numerators are multiples of the first numerator in the set and the denominators are multiples of the first denominator in the set.

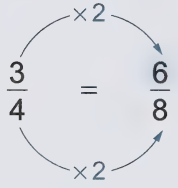
6. To make a fraction that is equivalent to a given fraction, multiply or divide its numerator and its denominator by the same factor.

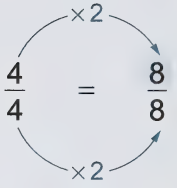
7. Textbook, page 105, Practise Your Skills, questions 1 to 3

1.









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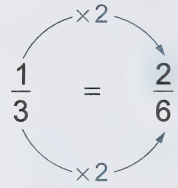

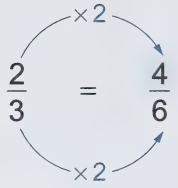

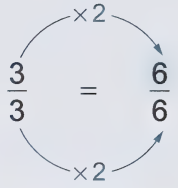

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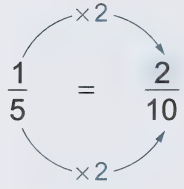
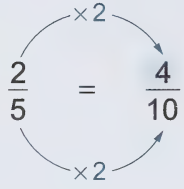
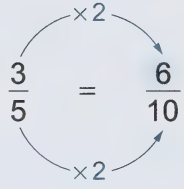
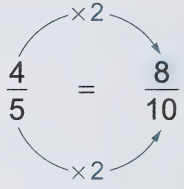


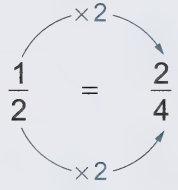






8. Practice and Homework Book, page 50, questions 1 to 9

1.



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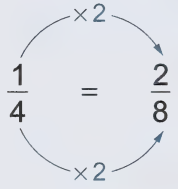

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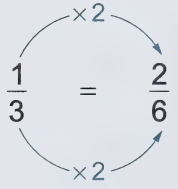

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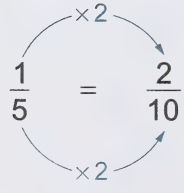

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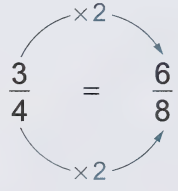

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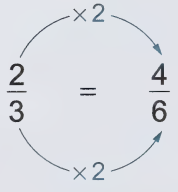

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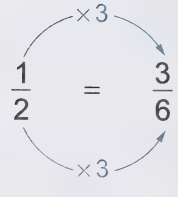

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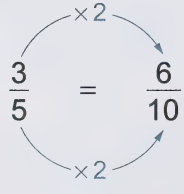

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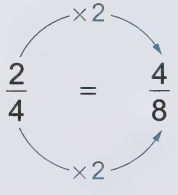
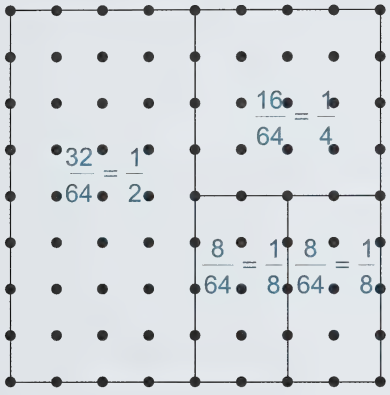


Activity 4

1. $\frac{8}{16}+\frac{4}{16}+\frac{2}{16}+\frac{1}{16}+\frac{1}{16}=1$ or $\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\frac{1}{16}+\frac{1}{16}=1$

2. Practice and Homework Book, page 46, questions 1 and 2

1.

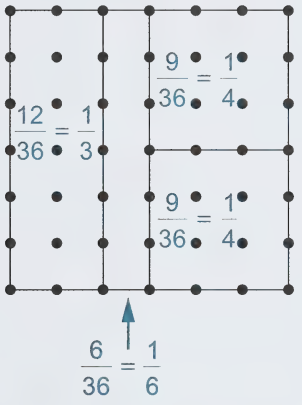


$\frac{32}{64}+\frac{16}{64}+\frac{8}{64}+\frac{8}{64}=1$

or

$\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\frac{1}{8}=1$

2.



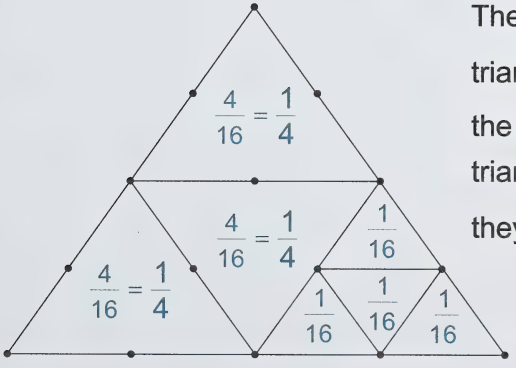
$\frac{12}{36}+\frac{6}{36}+\frac{9}{36}+\frac{9}{36}=1$

or

$\frac{1}{3}+\frac{1}{6}+\frac{1}{4}+\frac{1}{4}=1$

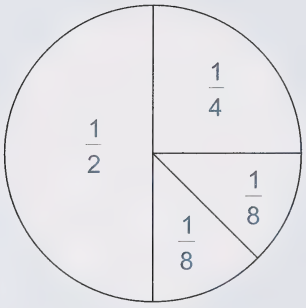
3. Textbook, page 101, On Your Own, questions 1 and 2

1.



The large triangle is made up of 16 small triangles. Thus, each small triangle is $\frac{1}{16}$ of the large triangle. The medium sized triangles are made up of 4 small triangles, so they are each $\frac{4}{16}$ or $\frac{1}{4}$ of the large triangle.

2.



$$\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\frac{1}{8}=1$$

Activity 5

1. The digital clock shows 5:30.

2. The digital clock shows 2:15.

3. a. $\frac{5}{60}=\frac{1}{12}$

So, 5 min is $\frac{1}{12}$ h.

b. $\frac{4}{60}=\frac{1}{15}$

So, 4 min is $\frac{1}{15}$ h.

c. $\frac{6}{60}=\frac{1}{10}$

So, 6 min is $\frac{1}{10}$ h.

4. a. $\frac{10}{60}=\frac{1}{6}$

So, 10 s is $\frac{1}{6}$ min.

b. $\frac{36}{60}=\frac{3}{5}$

So, 36 s is $\frac{3}{5}$ min.

c. $\frac{2}{60}=\frac{1}{30}$

So, 2 s is $\frac{1}{30}$ s.

5. a. $\frac{1}{10}=\frac{6}{60}$

So, $\frac{1}{10}$ h is 6 min.

b. $\frac{4}{5}=\frac{48}{60}$

So, $\frac{4}{5}$ h is 48 min.

c. $\frac{3}{4}=\frac{45}{60}$

So, $\frac{3}{4}$ h is 45 min.

6. a. $\frac{5}{6}=\frac{50}{60}$

So, $\frac{5}{6}$ min is 50 s.

b. $\frac{1}{5}=\frac{12}{60}$

So, $\frac{1}{5}$ min is 12 s.

c. $\frac{1}{12}=\frac{5}{60}$

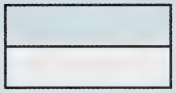
So, $\frac{1}{12}$ min is 5 s.

7. The Babylonians and the Alexandrians used a number system based on 60. They used 60 as the basis of their number system because the year was considered to have 360 days (6×60).

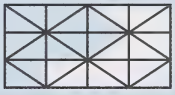
   Our time system, in which an hour is 60 min and a minute is 60 s, is a result of these early civilizations.

Challenge Activity

Answers will vary. Sample answers are given in the following two tables.

Single Folds	Sketch	How I Know the Cake Is Cut in Half
Fold in half horizontally, open, and shade half.		When I fold the paper horizontally, the shaded part fits exactly on the unshaded part.
Fold in half vertically, open, and shade half.		When I fold the paper vertically, the shaded part fits exactly on the unshaded part.
Fold in half on a diagonal, open, and shade half.		When I cut the paper on the fold and turn the shaded part, it fits exactly on the unshaded part.
Touch diagonally opposite corners and fold. Open. Shade half.		When I cut the paper on the fold and turn the shaded part, it fits exactly on the unshaded part.
Fold through centre*, open, and shade half.		When I cut the paper on any fold line through the centre and turn the shaded part, it fits exactly on the unshaded part.

*You can find the centre of the paper by first folding it in horizontally and then vertically. Where the fold lines cross is the centre.

Multiple Folds	Sketch	How I Know the Cake Is Cut in Half
Fold in half horizontally, then in thirds vertically. Open. Shade three parts.		There are six parts the same size, and three of them are shaded.
Fold in half horizontally, then in half vertically twice. Open. Shade four parts.		There are eight parts the same size, and four of them are shaded.
Fold in thirds horizontally, fold vertically twice, then fold on a diagonal. Open. Shade 12 parts.		There are 24 parts the same size, and twelve of them are shaded.

Lesson 2: Fractions as Parts of a Set

Activity 1

1. a. The officers represented $\frac{8}{48} = \frac{4}{24} = \frac{2}{12} = \frac{1}{6}$ of the whole crew.

b. The sailors represented $\frac{40}{48} = \frac{20}{24} = \frac{10}{12} = \frac{5}{6}$ of the whole crew.

c. The deck hands represented $\frac{8}{40} = \frac{4}{20} = \frac{2}{10} = \frac{1}{5}$ of the sailors.

d. The cabin boys represented $\frac{10}{40} = \frac{5}{20} = \frac{1}{4}$ of the sailors.

e. The navigators represented $\frac{2}{8} = \frac{1}{4}$ of the officers.

f. The captain's first, second, and third mates represented $\frac{3}{8}$ of the officers.

2. a. $\frac{3}{12} = \frac{1}{4}$

One-fourth $\left(\frac{1}{4}\right)$ of the carton is empty.

b. One-eighth $\left(\frac{1}{8}\right)$ of the crayons are missing.

Activity 2

1. **a.** **th**ousand
   b. sk**irt**
   c. m**y**
   d. **f**ilthy
   e. belie**ve**
   f. o**pa**l
   g. **c**all
   h. ros**es**
   i. Con**nor**
   j. **th**oughtful
   k. s**oft**
   l. sm**oth**ered
   m. **p**ainting
   n. **alm**ond
   o. s**tree**t

   Message: Thirty-five paces north of the palm tree

2. **a.** last fourth
   b. first half
   c. second fifth
   d. last two-thirds
   e. middle seventh
   f. first third
   g. first fourth
   h. last third
   i. second fourth
   j. last half

3. **a.** The 24 treasure chests could possibly have been shared by either 2, 3, 4, 6, 8, 12, or 24 sailors. All of these numbers are factors of 24.

   b. Two sailors would each have got $\frac{2}{24} = \frac{1}{12}$ of the treasure.

   Three sailors would each have got $\frac{3}{24} = \frac{1}{8}$ of the treasure.

   Four sailors would each have got $\frac{4}{24} = \frac{2}{12} = \frac{1}{6}$ of the treasure.

   Six sailors would each have got $\frac{6}{24} = \frac{3}{12} = \frac{1}{4}$ of the treasure.

   Eight sailors would each have got $\frac{8}{24} = \frac{4}{12} = \frac{1}{3}$ of the treasure.

   Twelve sailors would each have got $\frac{12}{24} = \frac{6}{12} = \frac{1}{2}$ of the treasure.

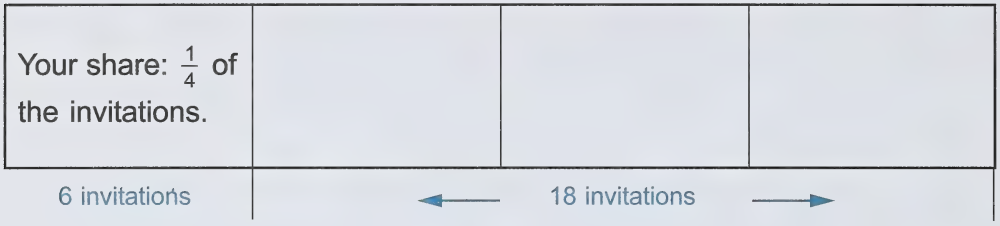
   Twenty-four sailors would each have got $\frac{1}{24}$ of the treasure.

Activity 3

1. a. Texbook, page 103, On Your Own, question 1

Following is one way to solve the problem:

You write $\frac{6}{24} = \frac{1}{4}$ of the invitations, so draw a rectangle to represent the whole box. Divide the box into 4 equal parts and show your share.

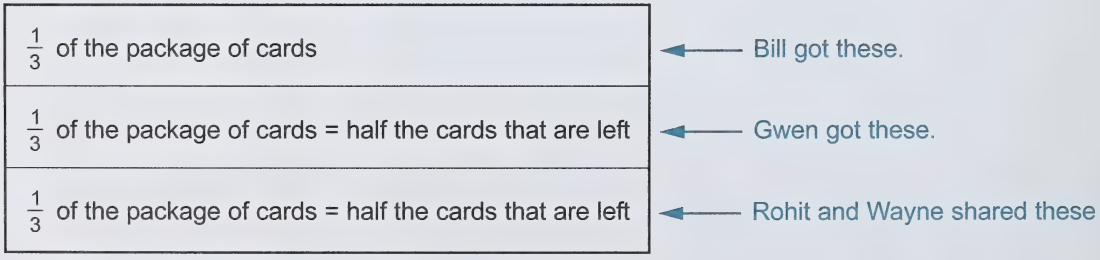


There are 3 equal parts left and each part represents $\frac{1}{4}$ of the box.

Since your 3 friends will equally share the remaining invitations, each of them will write $18 \div 3 = 6$ invitations. Since 6 invitations is $\frac{1}{4}$ of the invitations, each friend will write $\frac{1}{4}$ of the invitations.

b. Yes, you will write the same number of invitations as each of your friends. Each of you writes 6 invitations.

2. The diagram shows how the cards were shared.


1/3 of the package of cards
Bill got these.
1/3 of the package of cards = half the cards that are left
Gwen got these.
1/3 of the package of cards = half the cards that are left
Rohit and Wayne shared these

a. Rohit and Wayne each had 3 cards, which is 6 cards between them. This means that 6 is $\frac{1}{3}$ of the package, so Rohit must have had $3 \times 6 = 18$ cards to begin with.

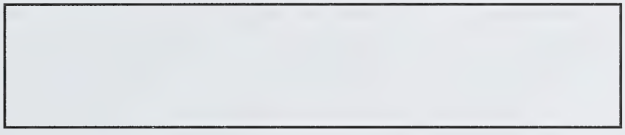
b. Gwen was given the same number of cards that Rohit and Wayne had between them, so she had 6 cards, which is $\frac{6}{18} = \frac{3}{9} = \frac{1}{3}$ of the full package of cards.

Rohit and Wayne each had 3 cards, which is $\frac{3}{18} = \frac{1}{6}$ of the full package of cards.

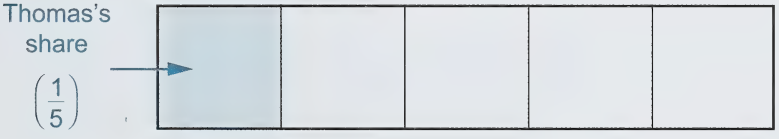
3. Homework and Practice Book, page 48, questions 1 and 2

1. You can use the following reasoning to solve the problem.

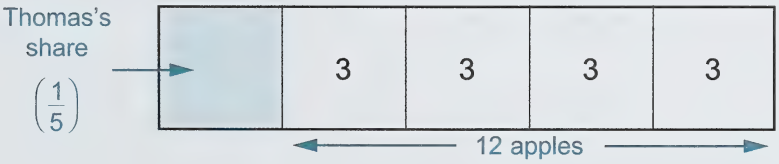
- Make a rectangle to represent the apples.



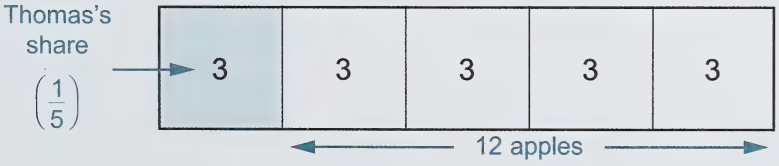
- Show Thomas's share $\left(\frac{1}{5}\right.$ of the apples$\left.\right)$.



- Because the 12 remaining apples must be divided equally among the 4 remaining parts, there are $12 \div 4 = 3$ apples in each part.



- All the shares must be equal, so Thomas must have 3 apples.

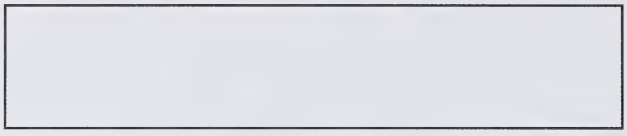


- There were $3 + 3 + 3 + 3 + 3 = 15$ apples.

Check: Thomas took 3 of 15 apples $\left(\frac{3}{15} = \frac{1}{5}\right)$. This leaves 12 apples.

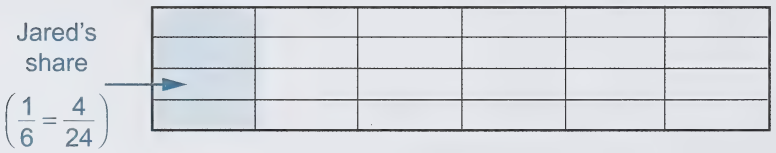
2. You can use the following reasoning to solve the problem.

- Make a rectangle to represent the juice boxes in the cooler.

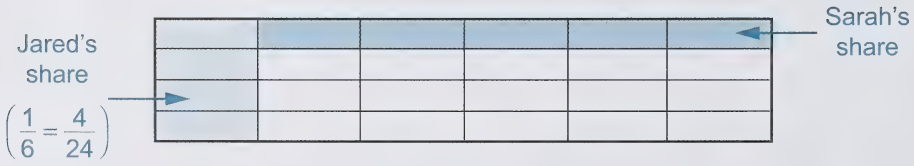


- Show Jared's share $\left(\frac{1}{6}\right.$ of the boxes$\left.\right)$ by dividing the rectangle into 6 equal parts.

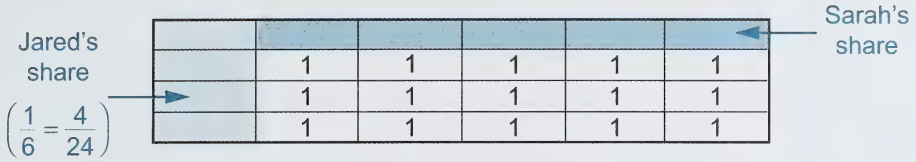
- Sarah took $\frac{1}{4}$ of what was left. The 5 remaining parts of the rectangle make this difficult. But you can divide the whole rectangle horizontally to create 24 equal parts. **Note:** Jared's share is equal to $\frac{4}{24}$.



- Show Sarah's share by shading 5 of the 20 remaining parts. **Note:** Sarah's share is $\frac{1}{4} = \frac{5}{20}$ of the remaining parts.



- There are now 15 remaining parts in the rectangle and 15 remaining juice boxes. So, there is a juice box for each remaining part.



This means there were 24 juice boxes to begin with.

Check: Jared took 4 of the 24 boxes $\left(\frac{4}{24} = \frac{1}{6}\right)$. Sarah took 5 of the remaining 20 boxes $\left(\frac{5}{20} = \frac{1}{4}\right)$. This leaves 15 boxes.

Challenge Activity

1. One way to solve the problem is to work backward.

- Jamie and Jenny each got 2 cookies, which is 4 cookies between them.
- The 4 cookies between them is one less than half of the total number of cookies, so half of the batch must be 5 cookies.
- If half the batch is 5 cookies, then the whole batch must be 10 cookies.

Jenny made 10 cookies.

2.
- Jamie and Jenny each got 2 cookies, which is $\frac{2}{10} = \frac{1}{5}$ of the batch of cookies.
- Elise also got $\frac{1}{5}$ of the batch which is 2 cookies. Together, Jamie, Jenny, and Elise got $2 + 2 + 2 = 6$ of the cookies.
- $10 \text{ cookies} - 6 \text{ cookies} = 4 \text{ cookies}$ for Pat and Tim to share. Since they each got the same number of cookies, they each got $4 \div 2 = 2$ cookies. Therefore, each of the 5 people got $\frac{2}{10} = \frac{1}{5}$ of the batch of cookies.

Lesson 3: Connecting Fractions and Decimals

Activity 1

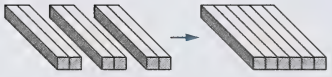
1. a. $\frac{3}{10} = 0.3$ **b.** $\frac{7}{10} = 0.7$ **c.** $\frac{9}{10} = 0.9$

2. To write any proper fraction that has a denominator of 10 as a decimal, write a zero to show there is no whole, make a decimal point, and then write the numerator in the tenths place (the place to the right of the decimal point).

3. a.

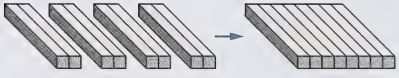
$\frac{2}{5} = \frac{4}{10} = 0.4$

b.



$\frac{3}{5} = \frac{6}{10} = 0.6$

c.



$\frac{4}{5} = \frac{8}{10} = 0.8$

4. a. To write any proper fraction that has a denominator of 5 as a decimal, multiply both the numerator and denominator by 2 to get an equivalent fraction that has a denominator of 10. Write a zero to show there is no whole, make a decimal point, and then write the new numerator in the tenths place.

b. $\frac{4}{5} = \frac{8}{10} = 0.8$

5. a.

$$\frac{2}{4} = \frac{1}{2} = \frac{5}{10} = 0.5$$

or

$$\frac{2}{4} = \frac{50}{100} = 0.5$$

b.

$$\frac{3}{4} = \frac{75}{100} = 0.75$$

6. To write any proper fraction that has a denominator of 4 as a decimal, multiply both the numerator and denominator by 25 to get an equivalent fraction that has a denominator of 100. Write a zero to show there is no whole, make a decimal point, and write the two digits of the new numerator representing the tenths and hundredths places.

7. a. $\frac{29}{50} = \frac{58}{100} = 0.58$

b. $\frac{13}{25} = \frac{52}{100} = 0.52$

c. $\frac{3}{6} = \frac{1}{2} = \frac{5}{10} = 0.5$

d. $\frac{6}{8} = \frac{3}{4} = \frac{75}{100} = 0.75$

e. $\frac{12}{20} = \frac{6}{10} = 0.6$

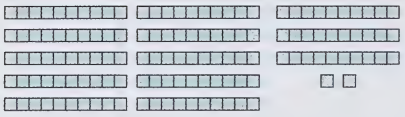
f. $\frac{9}{36} = \frac{1}{4} = \frac{25}{100} = 0.25$

Activity 2

1. Both Mike's and Chad's models show 1.32. Chad's model has 1 flat, 3 rods, and 2 small cubes. Mike's model has 1 flat, 2 rods, and 12 small cubes; he used 10 small cubes in place of 1 of the rods. Kirsten's model shows 1.23 with 1 flat, 2 rods, and 3 small cubes.

2. If the flat represents one whole, Chad's model uses the least number of base ten blocks to show 1.32. He used less than 10 small cubes and less than 10 rods, so none of the blocks could be regrouped to make the next largest size.

3. Janice might have used 13 rods and 2 small cubes.

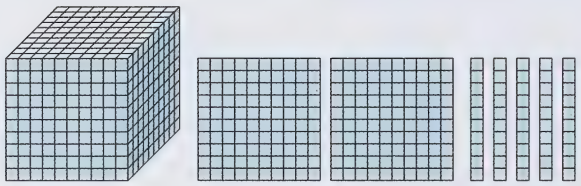


4. There are 18 combinations of flats, rods, and small cubes that can be used.

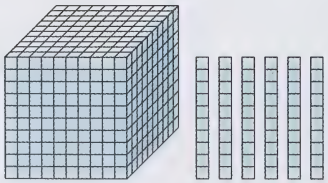
Number of Flats	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Rods	3	2	1	0	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Number of Small Cubes	2	12	22	32	2	12	22	32	42	52	62	72	82	92	102	112	122	132

5. **a.** The flat would represent one-tenth.
   b. The rod would represent one-hundredth.

6. **a.** 1.25

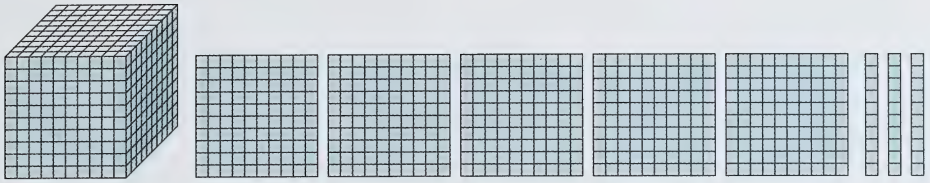


b. 1.06

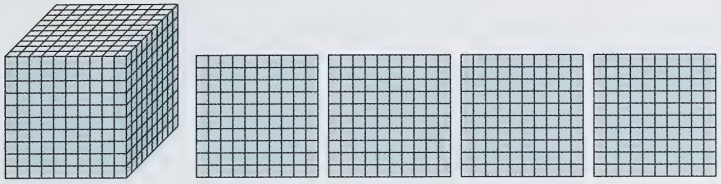


Note: Zero is used as a place holder in 1.06. No flats are used in the model of 1.06.

c. 1.53



d. 1.4



7. If you used a rod to represent one whole, you could use small cubes to represent tenths. The small cube is the smallest base ten block, so you could not represent hundredths.

8. a.

Regrouped Blocks	3	3	6
Expanded form using place-value words: 3 ones + 3 tenths + 6 hundredths			
Expanded form: 3 + 0.3 + 0.06			
Standard form: 3.36			

b.

Regrouped Blocks	2	6	7
Expanded form using place-value words: 2 ones + 6 tenths + 7 hundredths			
Expanded form: 2 + 0.6 + 0.07			
Standard form: 2.67			

c.

Regrouped Blocks	4	0	1
Expanded form using place-value words: 4 ones + 1 hundredth			
Expanded form: 4 + 0.01			
Standard form: 4.01			

d.

Regrouped Blocks	2	9	0
Expanded form using place-value words: 2 ones + 9 tenths			
Expanded form: 2 + 0.9			
Standard form: 2.9 or 2.90			

Activity 3

1. **a.** A dime represents one-tenth of a dollar.
   b. A penny represents one-hundredth of a dollar.

2. **a.**

Regrouped Coins	5	0	4
Total value of coins ($): 5.04			

b.

Regrouped Coins	3	1	9
Total value of coins ($): 3.19			

c.

Regrouped Coins	7	3	6
Total value of coins ($): 7.36			

3. **a.** $\frac{1}{10} = 0.1$ **b.** $\frac{1}{100} = 0.01$

$1 = 10 dimes
$10 = 100 dimes

4.

	How I Spent My $10	Amount I Spent	Coins	Part of $10 as Fraction and Decimal
a.	Saturday Movie	$5.00	5 loonies	$\frac{5}{10} = 0.5$
b.	Popcorn	$2.00	2 loonies	$\frac{2}{10} = 0.2$
c.	Drink	$1.00	1 loonie	$\frac{1}{10} = 0.1$
d.	Bubble Gum	$0.50	5 dimes	$\frac{5}{100} = 0.05$
e.	Comic Book	$1.50	1 loonie and 5 dimes	$\frac{15}{100} = 0.15$

5. **a.** He saved $\frac{10}{100} = \frac{1}{10}$ or 0.1 of $100. **b.** He saved $\frac{4}{100}$ or 0.04 of $100.

c. He saved $\frac{15}{100}$ or 0.15 of $100. **d.** He saved $\frac{23}{100}$ or 0.23 of $100.

6. **Textbook, page 132, questions 1 and 2**

1. Decimals are found by multiplying or dividing by 10, 100, or 1000. Because there are 100 cm in 1 m, 1 cm = 0.01 m. Because 10 cm = 1 dm and there are 10 dm in 1 m, 10 cm = 0.1 dm and 1 dm = 0.1 m.

2. It makes sense to use decimals because the units are multiples of 10.

Challenge Activity

Answers will vary. The table on the following page shows some possible answers. Use logic like this: Because 4 quarters equal $1, the most quarters Linda could have is 3. If Linda had 3 quarters and at least 2 dimes, she could not have any nickels, and the most pennies she could have is 4.

Quarters	Dimes	Nickels	Pennies	Total Amount
3	4	0	4	$1.19
3	4	0	3	$1.18
3	4	0	2	$1.17
3	4	0	1	$1.16
3	4	0	0	$1.15
3	3	0	4	$1.09
3	3	0	3	$1.08
3	3	0	2	$1.07
3	3	0	1	$1.06
3	3	0	0	$1.05
3	1	4	4	$1.09
3	1	4	3	$1.08
3	1	4	2	$1.07
3	1	4	1	$1.06
3	1	4	0	$1.05
1	8	0	4	$1.09
1	8	0	3	$1.08
1	8	0	2	$1.07
1	8	0	1	$1.06
1	8	0	0	$1.05
1	9	0	4	$1.19
1	9	0	3	$1.18
1	9	0	2	$1.17
1	9	0	1	$1.16
1	9	0	0	$1.15

Linda could have $1.05, $1.06, $1.07, $1.08, $1.09, $1.15, $1.16, $1.17, $1.18, or $1.19 in her pocket.

Lesson 4: Comparing and Ordering Fractions and Decimals

Activity 1

1. a. $\frac{8}{24} = \frac{4}{12} = \frac{2}{6} = \frac{1}{3}$ of the whole quilt is blue.

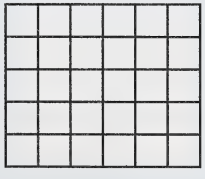
b. There are the same number of purple squares and yellow squares. These colours each represent $\frac{4}{24} = \frac{2}{12} = \frac{1}{6}$ of the whole quilt.

c. There are fewer green squares than any other colour of squares. The green squares represent $\frac{2}{24} = \frac{1}{12}$ of the whole quilt.

d. The colour not yet identified is red. The red squares represent $\frac{6}{24} = \frac{3}{12} = \frac{2}{8} = \frac{1}{4}$ of the whole quilt.

e. There are 6 red squares, which represent one-quarter of the whole quilt. Only the blue has more squares, so blue makes up more than one-quarter of the quilt.

2. Your drawing should look like the one below.



There are 30 squares in your quilt.

3. a. $\frac{1}{10} = \frac{3}{30}$, so 3 squares are red.

b. $\frac{1}{5} = \frac{6}{30}$, so 6 squares are green.

c. $\frac{1}{15} = \frac{2}{30}$, so 2 squares are blue.

d. $\frac{1}{6} = \frac{5}{30}$, so 5 squares are yellow.

e. $\frac{1}{3} = \frac{10}{30}$, so 10 squares are purple.

4. **a.** The number of coloured squares $= 3+6+2+5+10 = 26$. Because $30-26=4$, there are 4 white squares.

   b. $\frac{4}{30} = \frac{2}{15}$ of the squares are white.

5. Of the 30 squares, 2 were blue, 3 were red, 4 were white, 5 were yellow, 6 were green, and 10 were purple. The fractions in order from least to greatest are $\frac{1}{15}$, $\frac{1}{10}$, $\frac{2}{15}$, $\frac{1}{6}$, $\frac{1}{5}$, and $\frac{1}{3}$.

6. Once all the fractions are written with the same denominator, you can order the fractions by ordering the numerators.

7. The patterns will vary. Any three squares are red, any six squares are green, any two squares are blue, any five squares are yellow, any ten squares are purple, and any four squares are white.

Activity 2

1. The ten proper fractions you can make are $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{2}{3}$, $\frac{2}{4}$, $\frac{2}{5}$, $\frac{3}{4}$, $\frac{3}{5}$, and $\frac{4}{5}$.

2. **a.** $\frac{1}{2}$ $\quad \frac{1}{3} < \frac{2}{3}$ $\quad \frac{1}{4} < \frac{2}{4} < \frac{3}{4}$ $\quad \frac{1}{5} < \frac{2}{5} < \frac{3}{5} < \frac{4}{5}$

   b. If the denominators are the same, the wholes are all divided into the same number of equal parts. The numerators tell how many parts of the whole you are using, so the greater the numerator, the more parts of the whole you are using.

3. **a.** $\frac{1}{5} < \frac{1}{4} < \frac{1}{3} < \frac{1}{2}$ $\quad \frac{2}{5} < \frac{2}{4} < \frac{2}{3}$ $\quad \frac{3}{5} < \frac{3}{4}$ $\quad \frac{4}{5}$

   b. If the numerators are the same, then you are using the same number of different-sized parts. The greater the denominator, the more pieces the whole is broken into, and therefore the smaller each piece is.

4. a. Fractions less than $\frac{1}{2}$ are $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, and $\frac{2}{5}$.

b. Fractions greater than $\frac{1}{2}$ are $\frac{2}{3}$, $\frac{3}{4}$, $\frac{3}{5}$, and $\frac{4}{5}$.

c. If the denominator is more than double the numerator, the fraction is less than $\frac{1}{2}$. If the denominator is less than double the numerator, the fraction is greater than $\frac{1}{2}$.

d. Double the numerator: $4 \times 2 = 8$. Since $7 < 8$, $\frac{4}{7} > \frac{1}{2}$.

5. Your explanation may be similar to the following:

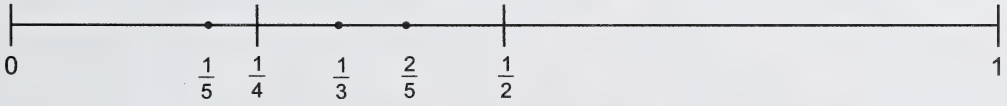
$\frac{1}{4}$ is half-way between 0 and $\frac{1}{2}$.

$\frac{1}{5}$ and $\frac{1}{4}$ have the same numerator. Compare the denominators using the rule from question 3: $\frac{1}{5} < \frac{1}{4}$.

$\frac{1}{3}$ and $\frac{1}{4}$ have the same numerators. Compare their denominators using the rule from question 3: $\frac{1}{3} > \frac{1}{4}$.

$\frac{2}{5}$ and $\frac{1}{5}$ have the same denominators. Compare their numerators using the rule from question 2: $\frac{2}{5} > \frac{1}{5}$.

A $\frac{2}{5}$ fraction bar is longer than a $\frac{1}{3}$ fraction bar but shorter than a $\frac{1}{2}$ fraction bar, so $\frac{2}{5}$ would be placed between $\frac{1}{3}$ and $\frac{1}{2}$.



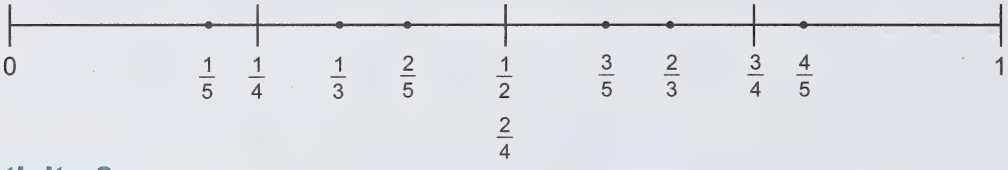
6. Your explanation may be similar to the following:

$\frac{3}{4}$ is half-way between $\frac{1}{2}$ and 1.

$\frac{3}{5}$ and $\frac{3}{4}$ have equal numerators. Compare their denominators using the rule from question 3: $\frac{3}{5} < \frac{3}{4}$.

A $\frac{4}{5}$ fraction strip is longer than a $\frac{3}{4}$ fraction strip, so $\frac{4}{5} < \frac{3}{4}$.

A $\frac{2}{3}$ strip fraction strip is longer than a $\frac{3}{5}$ fraction strip, but shorter than a $\frac{3}{4}$ fraction strip, so $\frac{3}{5} < \frac{2}{3} < \frac{3}{4}$.



Activity 3

1. a.

Place	Country	Time
First	Canada	6 minutes 30.85 seconds
Second	United States	6 minutes 31.86 seconds
Third	Germany	6 minutes 32.34 seconds
Fourth	China	6 minutes 32.50 seconds
Fifth	Romania	6 minutes 37.24 seconds
Sixth	Australia	6 minutes 41.72 seconds

b. A seventh-place finish would be any time greater than 6 minutes 41.72 seconds (for example, 6 minutes 41.73 seconds).

c. The bronze medal went to the team whose time was 6 minutes 32.34 seconds. To beat them and win the bronze medal, the fourth place team would have needed a time from 6 minutes 32.33 seconds to 6 minutes 31.87 seconds.

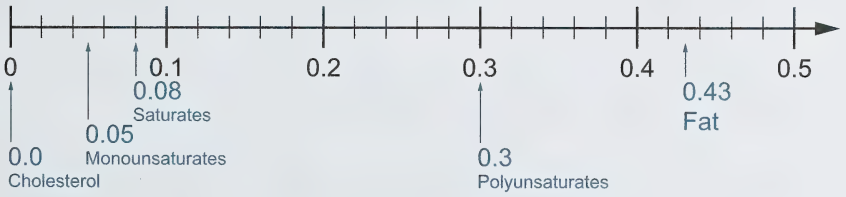
2. Following are the rules for ordering decimals:

- If the whole number part of the decimals are the same, look at the numbers in the tenths place of each decimal. The greater the number in the tenths place is, the greater the decimal is.
- If the numbers in the tenths place are the same, look at the numbers in the hundredths place of each decimal. The greater the number in the hundredths place is, the greater the decimal is.

3. a. The arrow shows 28.5. It is half-way between 28 and 29.
b. The arrow shows 14.25. The arrow is half-way between 14.2 and 14.3.

4. a.

b.



5. It is usually easier to order whole numbers and decimals than it is to order fractions because whole numbers and decimals have place value.

6. It is easy to order a set of fractions if they all have the same numerators or if they all have the same denominators.

7. a. $\frac{1}{4} > 0.2$ since $\frac{1}{4} = 0.25$.

b. $0.61 > 0.16$ since $\frac{61}{100} > \frac{16}{100}$.

c. $0.75 < \frac{8}{10}$ since $\frac{8}{10} = 0.8$ and $0.75 < 0.8$.

Challenge Activity

1. The names in order from who had the most blue candies to who had the least are as follows:

   Abe: $\frac{3}{4} = \frac{75}{100} = 0.75$

   Deepti: $0.7 = 0.70$

   Cindy: $\frac{13}{20} = \frac{65}{100} = 0.65$

   Bianca: $0.6 = 0.60$

   Eli: $\frac{3}{5} = \frac{60}{100} = 0.6$

   Fred: 0.35

2. Cindy: $\frac{13}{20} = \frac{65}{100}$

   Deepti: $0.7 = \frac{70}{100}$

   Genevieve has more than Cindy, but less than Deepti.

   If Genevieve had 100 gumballs, she could have 66, 67, 68, or 69 blue gumballs. However, she only has 50, so look for equivalent fractions.

   $\frac{66}{100} = \frac{33}{50}$ and $\frac{68}{100} = \frac{34}{50}$

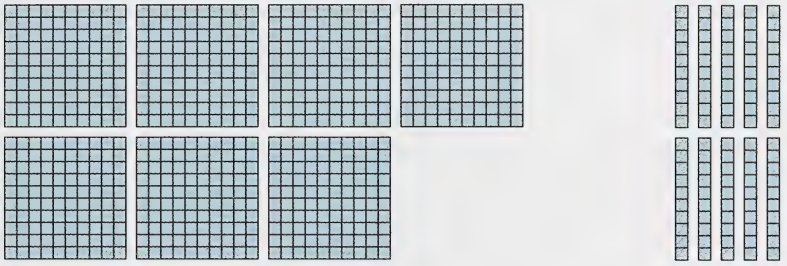
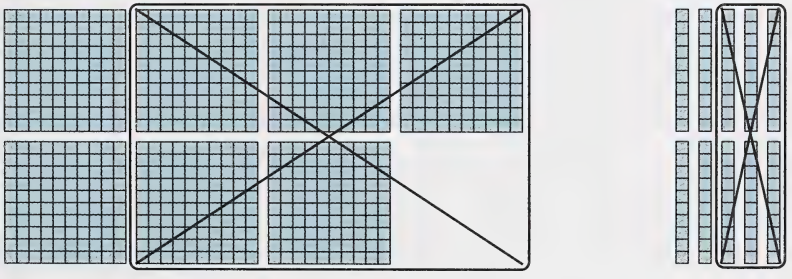
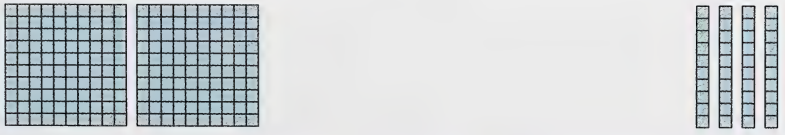
   There are no equivalent fractions for $\frac{67}{100}$ and $\frac{69}{100}$ that have denominators of 50.

   Genevieve could have 33 or 34 blue gumballs.

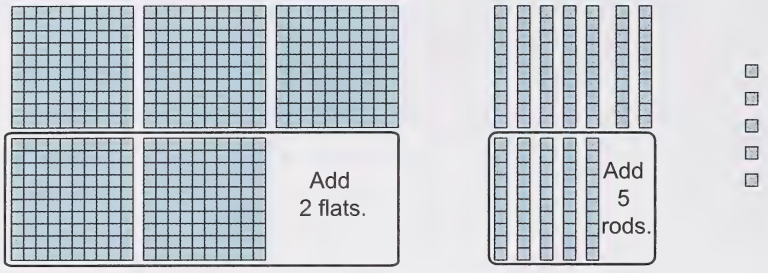
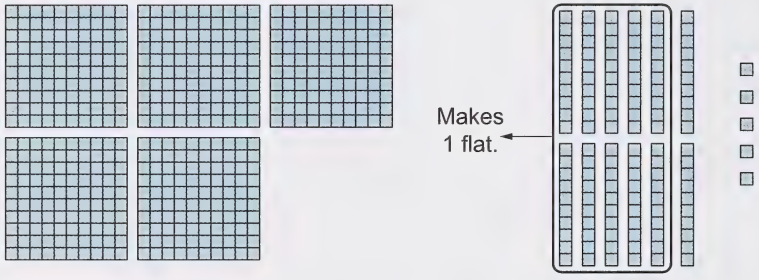
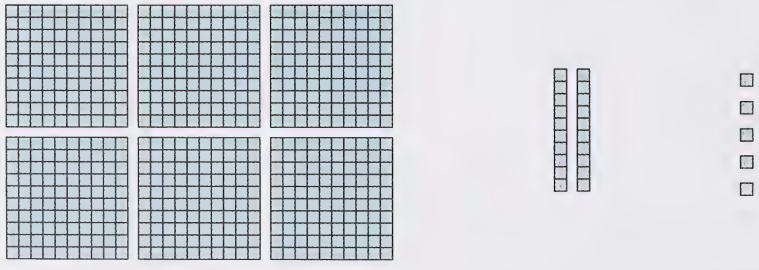
Lesson 5: Adding and Subtracting Decimals

Activity 1

1. By the time the ship docked at the first port, 2.4 barrels of rice had been used.

Model	Paper-and-Pencil Method
Step 1: Model 8.0. 	8.0
Step 2: Trade 1 flat for 10 rods. 	$\overset{7\ 10}{\cancel{8}.\cancel{0}}$
Step 3: Take away 5.6. 	$\overset{7\ 10}{\cancel{8}.\cancel{0}}$ $-\ 5.6$
Step 4: Find the number of blocks remaining. 	$\overset{7\ 10}{8.0}$ $-\ 5.6$ 2.4

2. When the ship left the first port, 6.25 barrels of coffee were on hand.

Model	Paper-and-Pencil Method
Step 1: Model 3.75. 	$\begin{array}{r} 3.75 \\ +\ 2.50 \end{array}$
Step 2: Trade 10 rods for 1 flat. 	$\begin{array}{r} {\scriptstyle 1} \\ 3.75 \\ +\ 2.50 \\ \hline 25 \end{array}$
Step 3: Find the total. 	$\begin{array}{r} {\scriptstyle 1} \\ 3.75 \\ +\ 2.50 \\ \hline 6.25 \end{array}$

3.
$$\begin{array}{r} {\scriptstyle 1\ 1} \\ 3.65 \\ 2.50 \\ +\ 1.75 \\ \hline 7.90 \end{array}$$

When the ship left the third port, 7.9 containers of tea were on hand.

4.
$$\begin{array}{r} 4.25 \\ +\ 3.50 \\ \hline 7.75 \\ -\ 2.75 \\ \hline 5.00 \end{array}$$

There were 5 containers of tea on hand when they arrived home.

5.
$$\begin{array}{r} {\scriptstyle 7\ 1} \\ 18.25 \\ -\ 12.50 \\ \hline 5.75 \\ +\ 2.00 \\ \hline 7.75 \end{array}$$

There were 7.75 containers of flour on hand at the beginning of the voyage.

Activity 2

Textbook, page 129, Practise Your Skills, questions 1, 2, 3, 10, 11, and 12

1. Estimate: $4.59 + 0.89$ is about $5 + 1 = 6$.

$$\begin{array}{rl} 4.59 & \\ +\ 0.89 & \\ \hline 5.48 & \text{Solution} \\ -\ 0.89 & \text{Check} \\ \hline 4.59 & \end{array}$$

2. Estimate: $63.8 + 1.79$ is about $64 + 2 = 66$.

$$\begin{array}{rl} 63.80 & \\ +\ 1.79 & \\ \hline 65.59 & \text{Solution} \\ -\ 1.79 & \text{Check} \\ \hline 63.80 & \end{array}$$

3. Estimate: $6.4 + 0.5$ is about $6.5 + 0.5 = 7$.

$$\begin{array}{rl} & 6.4 \\ + & 0.5 \\ \hline & 6.9 \quad \text{Solution} \\ - & 0.5 \quad \text{Check} \\ \hline & 6.4 \end{array}$$

10. Estimate: $8.7 - 3.9$ is about $9 - 4 = 5$.

$$\begin{array}{rl} & 8.7 \\ - & 3.9 \\ \hline & 4.8 \quad \text{Solution} \\ + & 3.9 \quad \text{Check} \\ \hline & 8.7 \end{array}$$

11. Estimate: $76.3 - 20.5$ is about $76 - 20 = 56$.

$$\begin{array}{rl} & 76.3 \\ - & 20.5 \\ \hline & 55.8 \quad \text{Solution} \\ + & 20.5 \quad \text{Check} \\ \hline & 76.3 \end{array}$$

12. Estimate: $86.52 - 59.2$ is about $87 - 60 = 27$.

$$\begin{array}{rl} & 86.52 \\ - & 59.20 \\ \hline & 27.32 \quad \text{Solution} \\ + & 59.20 \quad \text{Check} \\ \hline & 86.52 \end{array}$$

Activity 3

1. The sundae costs \$3.59, so that leaves you with \$12.00 – \$3.59 = \$8.41 to spend on your hot dish and salad.

		Salads			
		Taco Salad	**Tuna Salad**	**Chef's Salad**	**Green Salad**
Hot Dishes		3.25	2.95	3.99	1.75
Beef Chili	5.95	9.20	8.90	9.94	7.70
Macaroni and Cheese	4.59	7.84	7.54	8.58	6.34
Chimichanga	5.75	9.00	8.70	9.74	7.50
Franks and Beans	3.89	7.14	6.84	7.88	5.64
Veal Parmigiana	5.95	9.20	8.90	9.94	7.70

- If you order beef chili, you can order a small green salad.
- If you order macaroni and cheese, you can order a taco salad, a tuna salad, or a small green salad.
- If you order a chimichanga, you can order a small green salad.
- If you order franks and beans, you can order any one of the four salads.
- If you order veal parmigiana, you can order a small green salad.

2. You can order tomato soup, a bean burrito, milk, and fruit salad for \$7.68.

Tomato Soup	+	Bean Burrito	+	Fruit Salad	+	Milk	
1.95		2.99		1.49		1.25	= \$7.68

3. You can order chef's salad, beef chili or veal parmigiana, juice, and a sundae for \$14.98.

Chef's Salad	+	Beef Chili or Veal Parmigiana	+	Sundae	+	Juice	
3.99		5.95		3.59		1.45	= \$14.98

4. You would receive $0.52 change from $10.

Tuna Salad	+	Chicken Burrito	+	Fruit Salad	+	Juice	
2.95		3.59		1.49		1.45	= $9.48

$10.00 - 9.48 = 0.52$

5. You ordered a cheeseburger and pie.

		Desserts		
		Pie	**Fruit Salad**	**Sundae**
Sandwiches		1.95	1.49	3.59
Turkey	4.35	6.30	5.84	7.94
Ham and Cheese	5.95	7.90	7.44	9.54
Bean Burrito	2.99	4.94	4.48	6.58
Chicken Burrito	3.59	5.54	5.08	7.18
Hamburger	3.79	5.74	5.28	7.38
Cheeseburger	4.99	6.94	6.48	8.58
Grilled Chicken	4.75	6.70	6.24	8.34

6. The menu items all end in 5¢ and 9¢. A total of $7.20 has dollars and dimes, but no pennies, so all of the items ordered must have ended in 5¢.

You and your friend could have ordered any two of the following three lunch combinations: beef chili and milk, veal parmigiana and milk, or chimichanga and juice.

		Beverages	
		Milk	**Juice**
Hot Dishes		1.25	1.45
Beef Chili	5.95	7.20	7.40
Chimichanga	5.75	7.00	7.20
Veal Parmigiana	5.95	7.20	7.40

7. Practice and Homework Book, page 60, question 1

Answers will vary. Following is one sample response.

Chicken Noodle	+	Grilled Cheese	+	Milk Shake	
1.69		1.95		1.95	= $5.59

Change: 7.00 – 5.59 = $1.41

Challenge Activity

1. Solution methods will vary. A sample answer is given.

Use the guess-and-check strategy.

Tory's Savings	Cary's Savings	Zeb's Savings	Total Savings	
10.00	12.50	8.75	31.25	Not enough
10.50	13.00	9.25	32.75	Not enough
11.00	13.50	9.75	34.25	Closer!
11.50	14.00	10.25	35.75	Too much
11.25	13.75	10.00	35.00	Right on!

Tory saved $11.25, Cary saved $13.75, and Zeb saved $10.00.

2. Practice and Homework Book, page 62, question 1

Use the guess-and-check strategy.

4 pennies	0.04
5 quarters	1.25
3 dimes	0.30
2 loonies	2.00
14 coins	$3.59

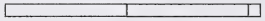
Lesson 6: Multiplying and Dividing Decimals

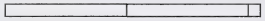
Activity 1

1. a. You will use a small cube from the base ten set to represent 0.1 m.

b. 0.1 m = 1 dm (one decimetre)

2. a.

2.1 m 

2.1 m 

2.1 m

b.

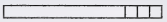
6.3 m

c.

$$\begin{array}{rr} & 2.1 \\ & \times\ 3 \\ \hline 3\times 2= & 6.0 \\ 3\times 0.1= & 0.3 \\ \hline & 6.3 \end{array}$$

d. Yes, $7 > 6.3$.

3. a.

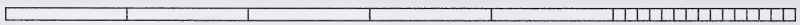
1.3 m 

1.3 m

1.3 m

1.3 m

1.3 m

b. 

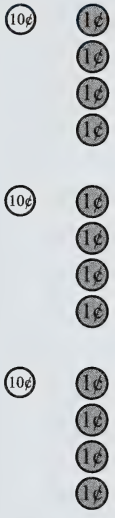
c.

d.

$$\begin{array}{rr} & 1.3 \\ & \times\ 5 \\ \hline 5\times 1= & 5.0 \\ 5\times 0.3= & 1.5 \\ \hline & 6.5 \end{array}$$

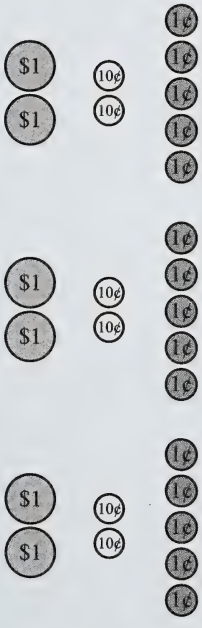
e. Yes, $7 > 6.5$.

Activity 2

1. a. 

$$\begin{array}{r} 0.14 \\ \times \quad 3 \\ \hline 0.30 \\ 0.12 \\ \hline 0.42 \end{array} \qquad \begin{array}{l} \\ \\ 3 \times 0.10 = \\ 3 \times 0.04 = \\ \\ \end{array}$$

The 3 candies cost $0.42.

b. 

$$\begin{array}{r} 2.25 \\ \times \quad 3 \\ \hline 6.00 \\ 0.60 \\ 0.15 \\ \hline 6.75 \end{array} \qquad \begin{array}{l} \\ \\ 3 \times 2 = \\ 3 \times 0.20 = \\ 3 \times 0.05 = \\ \\ \end{array}$$

The 3 cards cost $6.75.

2. Practice and Homework Book, page 64, questions 1 and 2

1.

$$\begin{array}{rr} & 0.79 \\ \times & 6 \\ \hline 6 \times 0.70 = & 4.20 \\ 6 \times 0.09 = & 0.54 \\ \hline & 4.74 \end{array}$$

or

$$\begin{array}{r} {\scriptstyle 5} \\ 0.79 \\ \times \quad 6 \\ \hline 4.74 \end{array}$$

2.

$$\begin{array}{rr} & 1.59 \\ \times & 9 \\ \hline 9 \times 1 = & 9.00 \\ 9 \times 0.50 = & 4.50 \\ 9 \times 0.09 = & 0.81 \\ \hline & 14.31 \end{array}$$

or

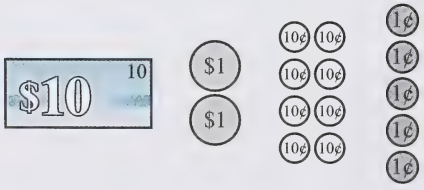
$$\begin{array}{r} {\scriptstyle 5\ 8} \\ 1.59 \\ \times \quad 9 \\ \hline 14.31 \end{array}$$

Activity 3

1. a. $12.85 \div 3 \doteq 12 \div 3$
$\doteq 4$

Danielle can spend about $4 on each gift.

b. You can represent $12.85 this way.



The following steps show how the model and paper-and-pencil method are connected.

Model	Paper-and-Pencil Method
Step 1: Trade the ten-dollar bill for 10 loonies. You now have 12 loonies. Put the loonies in 3 groups of 4. This uses 12 loonies. You have no loonies left. (But you have 8 dimes and 5 nickles to work with.)	$3\overline{)12.85}$ → 4; 12; 0
Step 2: Put the 8 dimes in 3 groups of 2. This uses 6 dimes. You have 2 dimes left over. (You also have 5 pennies to work with.)	$3\overline{)12.85}$ → 4.2; 12; 08; 6; 2
Step 3: Trade the 2 dimes for 20 pennies. You now have 25 pennies. Put the pennies in 3 groups of 8. This uses 24 pennies and you have 1 penny left over.	$3\overline{)12.85}$ → 4.28; 12; 08; 6; 25; 24; 1

Danielle can spend $4.28 on each gift.

2. Textbook, page 134, Estimate and Solve, question 4

Estimates and methods will vary. Sample answers are given.

Estimate: One doughnut would cost a little less than 50¢. $6 \times 50¢ = \$3.00$ and \$2.75 is a little less than \$3.00.

$$
\begin{array}{r}
0.45 \\
6\overline{)2.75} \\
\underline{24\downarrow} \\
35 \\
\underline{30} \\
5
\end{array}
$$

There is a remainder, so you would have to pay an extra penny. One doughnut would cost \$0.46.

Estimate: One cookie would cost about 30¢. $3 \times 30¢ = 90¢$, and \$0.89 is only 1 penny less than 90¢.

$$
\begin{array}{r}
0.29 \\
3\overline{)0.89} \\
\underline{6\downarrow} \\
29 \\
\underline{27} \\
2
\end{array}
$$

There is a remainder, so you would have to pay an extra penny. One cookie would cost \$0.30.

Estimate: One muffin would cost a little less than 60¢. $6 \times 60¢ = \$3.60$ and \$3.50 is a little less than \$3.60.

$$
\begin{array}{r}
0.58 \\
6\overline{)3.50} \\
\underline{30\downarrow} \\
50 \\
\underline{48} \\
2
\end{array}
$$

There is a remainder, so you would have to pay an extra penny. One muffin would cost \$0.59.

Estimate: One bun would cost 25¢. If 8 buns cost $2.00, then 4 buns would cost $1.00, so each bun would cost $0.25. $8 \times 25¢ = \$2.00$, so each bun would cost $0.25.

Estimate: Add the estimates for each item: $50¢ + 30¢ + 60¢ + 25¢$. The first and second items are about 80¢ in total, and the third and fourth items are also about 80¢ in total, so the total of all 4 items is about $2 \times 80¢$, which is about $1.60.

Add the prices for each item: $\$0.46 + \$0.30 + \$0.59 + \$0.25 = \$1.60$.

3. **Practice and Homework book, page 64, questions 4 and 6**

4. Methods will vary.

```
  0.21
6)1.29
  12
  09
   6
   3
```

Because there is a remainder, you must round up the answer to $0.22.

One orange would cost $0.22.

6. One dozen is 12; $\frac{1}{2}$ dozen is 6. To find the cost of $\frac{1}{2}$ dozen, divide by 2.

```
  2.47
2)4.95
  4
  09
   8
   15
   14
    1
```

Because there is a remainder, round the answer up to $2.48.

Half a dozen buns would cost $2.48.

Activity 4

Textbook, page 130, Solving Problems with Money, questions 1 to 5

1. You can buy 6 pretzels: $1.50 = 6$ quarters. You will get 1 free pretzel for each 3 that you buy, so you will get 2 free pretzels. You can get a total of 8 pretzels for $1.50.

2. You will have to use 3 pennies, so you will need 7 more coins to make 70¢.

Quarters	Dimes	Nickels	Pennies	Total Amount
0	7	0	3	$70¢ + 3¢ = 73¢$
1	1	5	3	$25¢ + 10¢ + 25¢ + 3¢ = 63¢$
1	2	4	3	$25¢ + 20¢ + 20¢ + 3¢ = 68¢$
1	3	3	3	$25¢ + 30¢ + 15¢ + 3¢ = 73¢$
1	4	2	3	$25¢ + 40¢ + 10¢ + 3¢ = 78¢$
2	1	4	3	$50¢ + 10¢ + 20¢ + 3¢ = 83¢$
2	0	5	3	$50¢ + 25¢ + 3¢ = 78¢$

You can use 7 dimes and 3 pennies or 1 quarter, 3 dimes, 3 nickels, and 3 pennies.

3. Make a table to consider all the possible combinations.

Number of Quarters	Number of Dimes	Total Amount of Money
1	10	$0.25 + $1.00 = $1.25
2	11	$0.50 + $1.10 = $1.60
3	12	$0.75 + $1.20 = $1.95
4	13	$1.00 + $1.30 = $2.30
5	14	$1.25 + $1.40 = $2.65
6	15	$1.50 + $1.50 = $3.00
7	16	$1.75 + $1.60 = $3.35
8	17	$2.00 + $1.70 = $3.70

You have 8 quarters and 17 dimes.

4. Make a table and look for a pattern.

Day	Pay for That Day	Total Pay
1	$0.01	$0.01
2	$0.02	$0.01 + $0.02 = $0.03
3	$0.04	$0.03 + $0.04 = $0.07
4	$0.08	$0.07 + $0.08 = $0.15
5	$0.16	$0.15 + $0.16 = $0.31
6	$0.32	$0.31 + $0.32 = $0.63
7	$0.64	$0.63 + $0.64 = $1.27
8	$1.28	$1.27 + $1.28 = $2.55
9	$2.56	$2.55 + $2.56 = $5.11
10	$5.12	$5.11 + $5.12 = $10.23
11	$10.24	$10.23 + $10.24 = $20.47
12	$20.48	$20.47 + $20.48 = $40.95
13	$40.56	$40.95 + $40.96 = $81.91

Your pay for the next day is always double your pay for the day before. Notice that the amount you have been paid altogether is 1¢ less than your pay for the following day. That means that your total pay at the end of Day 13 will be 1¢ less than your pay for Day 14.

You will be paid $81.91 altogether.

5. If you got 25¢ change from $52, that means you paid $51.75. Make a table to consider possible combinations. **Hint:** How could you use the constant addend feature of your calculator to help you build your table?

Adult Tickets	Student Tickets	Total Cost
$1 \times \$7.50 = \$7.50$	$7 \times \$4.75 = \$33.25$	$\$7.50 + \$33.25 = \$40.75$
$2 \times \$7.50 = \$15.00$	$6 \times \$4.75 = \$28.50$	$\$15.00 + \$28.50 = \$43.50$
$3 \times \$7.50 = \$22.50$	$5 \times \$4.75 = \$23.75$	$\$22.50 + \$23.75 = \$46.25$
$4 \times \$7.50 = \$30.00$	$4 \times \$4.75 = \$19.00$	$\$30.00 + \$19.00 = \$49.00$
$5 \times \$7.50 = \$37.50$	$3 \times \$4.75 = \$14.25$	$\$37.50 + \$14.25 = \$51.75$

You bought 5 adult tickets and 3 student tickets.

Challenge Activity

Using the guess-and-check method, here are some possible combinations you might try.

Start Time	Hours Before Midnight	Finish Time	Pay Before Midnight	Pay After Midnight	Total Earned	Result
11:00 P.M.	1	4:00 A.M.	$1 \times 3.50 = 3.50$	$4 \times 5.25 = 21.00$	$3.50 + 21.00 = 24.50$	Yes
7:00 P.M.	5	1:00 A.M.	$5 \times 3.50 = 17.50$	$1 \times 5.25 = 5.25$	$17.50 + 5.25 = 22.75$	No
8:00 P.M.	4	2:00 A.M.	$4 \times 3.50 = 14.00$	$2 \times 5.25 = 10.50$	$14.00 + 10.50 = 24.50$	Yes

There are two possible solutions:

- If Dan started at 11:00 **P.M.**, he finished at 4:00 **A.M.**
- If Dan started at 8:00 **P.M.**, he finished at 2:00 **A.M.**

Keystrokes

1. **a.** There are two possible numerators: 4 and 5.
   b. There are five possible numerators: 1, 2, 3, 4, and 5.
   c. There is one possible numerator: 5.
   d. There are three possible numerators: 11, 12, and 13.
   e. There are nine possible numerators: 8, 9, 10, 11, 12, 13, 14, 15, and 16.

2. **a.**

Keystrokes	ON/C	6.4	+	0.01	=	=	=	=	=	=	=	=
Display	0	6.4	6.4	0.01	6.41	6.42	6.43	6.44	6.45	6.46	6.47	6.48

b.

Keystrokes	ON/C	5.05	+	0.1	=	=	=	=	=	=	=	=
Display	0	5.05	5.05	0.1	5.15	5.25	5.35	5.45	5.55	5.65	5.75	5.85

c.

Keystrokes	ON/C	3.16	+	0.02	=	=	=	=	=	=	=	=
Display	0	3.16	3.16	0.02	3.18	3.2	3.22	3.24	3.26	3.28	3.3	3.32

d.

Keystrokes	ON/C	10.7	+	0.5	=	=	=	=	=	=	=	=
Display	0	10.7	10.7	0.5	11.2	11.7	12.2	12.7	13.2	13.7	14.2	14.7

e.

Keystrokes	ON/C	43.7	–	0.01	=	=	=	=	=	=	=
Display	0	43.7	43.7	0.01	43.69	43.68	43.67	43.66	43.65	43.64	43.63

3. **a.** Subtract 0.09
   b. Subtract 7.
   c. Add 0.02.
   d. Add 3.02.
   e. Subtract 0.11.
   f. Add 2.7.

Review

1. Textbook, page 116, Skill Bank from This Unit, questions 1 to 6

1. a. $\frac{1}{3}$ **b.** $\frac{3}{10}$ **c.** $\frac{1}{4}$

2. 3 rectangles

3. 4 circles

4. 6 circles

5. 6 squares

6. a. $\frac{1}{3}=\frac{4}{12}$ **b.** $\frac{1}{3}=\frac{3}{9}$ **c.** $\frac{2}{3}=\frac{8}{12}$ **d.** $\frac{2}{3}=\frac{6}{9}$

e. $\frac{1}{4}=\frac{2}{8}$ **f.** $\frac{1}{4}=\frac{4}{16}$ **g.** $\frac{3}{4}=\frac{6}{8}$ **h.** $\frac{2}{4}=\frac{8}{16}$

i. $\frac{1}{5}=\frac{2}{10}$ **j.** $\frac{1}{5}=\frac{5}{25}$ **k.** $\frac{4}{5}=\frac{8}{10}$ **l.** $\frac{3}{5}=\frac{15}{25}$

2. Textbook, page 145, Skill Bank Looking Back, questions 4 and 5

4. a. 12 **b.** 8 **c.** 6
d. 3 **e.** 4 **f.** 16
g. 18 **h.** 20 **i.** 9

5. a. $\frac{1}{3}=\frac{5}{15}$ **b.** $\frac{2}{3}=\frac{10}{15}$ **c.** $\frac{1}{6}=\frac{3}{18}$ **d.** $\frac{4}{6}=\frac{12}{18}$

e. $\frac{1}{5}=\frac{4}{20}$ **f.** $\frac{2}{5}=\frac{8}{20}$ **g.** $\frac{1}{10}=\frac{4}{40}$ **h.** $\frac{7}{10}=\frac{28}{40}$

3. Textbook, page 144, Skill Bank from This Unit, questions 1 to 3

1. a. $\frac{1}{10} = 0.1$ **b.** $\frac{3}{10} = 0.3$ **c.** $\frac{3}{100} = 0.03$

d. $\frac{31}{100} = 0.31$ **e.** $\frac{1}{4} = \frac{25}{100} = 0.25$ **f.** $\frac{1}{5} = \frac{2}{10} = 0.2$

g. $\frac{3}{4} = \frac{75}{100} = 0.75$ **h.** $\frac{3}{5} = \frac{6}{10} = 0.6$ **i.** $\frac{2}{10} = 0.2$

j. $\frac{9}{10} = 0.9$ **k.** $\frac{5}{100} = 0.05$

2. a. $7.7 > 6.6$ **b.** $0.9 < 9.0$ **c.** $14.6 < 41.2$
d. $8.47 < 8.74$ **e.** $9.35 > 9.32$ **f.** $46.19 > 43.97$

3. a. $2.58 < 5.28 < 5.82 < 8.52$
b. $37.03 < 37.09 < 39.07 < 39.3$

4. Textbook, page 127, Practise Your Skills, questions 1 to 9

1. $7.7 > 6.6$ **2.** $9.7 > 8.9$ **3.** $6.81 > 6.71$

4. $9.60 > 9.07$ **5.** $16.5 > 16.4$ **6.** $0.80 > 0.75$

7. $3.69 < 3.71 < 3.96$ **8.** $56.9 < 57.0 < 57.2$ **9.** $17.03 < 17.30 < 18.10$

5. a. Textbook, page 144, Skill Bank from This Unit, questions 4.a. to 4.d.

4. a. 9.25 **b.** 83.6 **c.** 11.71 **d.** 11.8

b. Textbook, page 144, Skill Bank from This Unit, questions 5.a. to 5.d.

5. a. 28.8 **b.** 24.45 **c.** 27.6 **d.** 48.15

c. Textbook, page 144, Skill Bank from This Unit, questions 6.a. to 6.d.

a. 15.1 **b.** 6.62 **c.** 8.2 **d.** 4.7

6. Textbook, page 144, Skill Bank from This Unit, questions 4.e. to 4.h.

4. e. 11.55 **f.** 15.12 **g.** 16.7 **h.** 103.9

Textbook, page 144, Skill Bank from This Unit, questions 5.e. to 5.l.

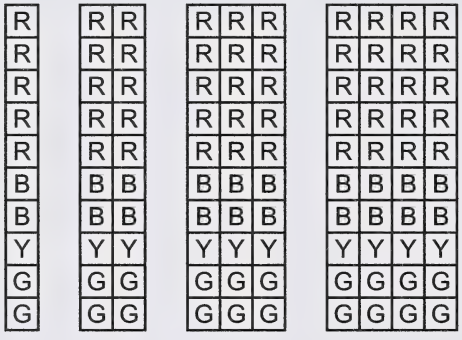
5. e. 446 **f.** 268.8 **g.** 97.28 **h.** 384.3
i. 980.4 **j.** 2243.2 **k.** 2085.3 **l.** 1094.6

Textbook, page 144, Skill Bank from This Unit, questions 6.e. to 6.h.

6. e. 0.23 **f.** 12.2 **g.** 12.67 **h.** 8.1

7. a. Textbook, page 112, Problem Bank, question 1 or 4

1. The number of equal parts in the rectangle can be 10 or any multiple of 10.



Red $= \frac{1}{2} = \frac{5}{10}$ $= \frac{10}{20}$ $= \frac{15}{30}$ $= \frac{20}{40}$

Blue $= \frac{1}{5} = \frac{2}{10}$ $= \frac{4}{20}$ $= \frac{6}{30}$ $= \frac{5}{40}$

Yellow $= \frac{1}{10}$ $= \frac{2}{20}$ $= \frac{3}{30}$ $= \frac{4}{40}$

Green $= \frac{2}{10}$ $= \frac{4}{20}$ $= \frac{6}{30}$ $= \frac{8}{40}$

4. The number of objects in Salim's bag must be 4 or a multiple of 4.

   If he has 4, 1 is red, 2 are yellow, and 1 is green.
   If he has 8, 2 are red, 4 are yellow, and 2 are green.
   If he has 12, 3 are red, 6 are yellow, and 3 are green.
   If he has 24, 6 are red, 12 are yellow, and 6 are green.
   If he has 36, 9 are red, 18 are yellow, and 9 are green.
   If he has 48, 12 are red, 24 are yellow, and 12 are green.

b. Textbook, page 112, Problem Bank, question 2 or 3

2. You take 12 jawbreakers, and $48 - 12 = 36$, so you have 36 jawbreakers left over. $36 \div 3 = 12$, so each friend gets 12 jawbreakers, and $\frac{12}{48} = \frac{1}{4}$ of the jawbreakers. Yes, they should agree that all of you got fair shares because you each got 12 jawbreakers or $\frac{1}{4}$ of the 48 jawbreakers.

3. **Solution 1:** Work backward.

   You got 3 treats, which is half the number that were in the bag when Tonya got it. Three is half of 6, so there were 6 in the bag when Tonya got it, and Tonya took 3. Six is half the number that were in the bag when Salim got it. Six is half of 12, so there were 12 in the bag when Salim got it, and Salim took 6. Twelve is half the treats in the bag to begin with. Twelve is half of 24, so there were 24 in the bag to begin with, and Kay took 12.

Solution 2: Draw a diagram.

Whole pack of treats

Kay took $\frac{1}{2}$ of the pack.

Kay took $\frac{1}{2}$.	$\frac{1}{2}$ is left.

Salim took $\frac{1}{2}$ of what was left, so he took $\frac{1}{4}$ of the pack.

Kay took $\frac{1}{2}$.	Salim took $\frac{1}{4}$.	$\frac{1}{4}$ is left.

Tanya took $\frac{1}{2}$ of what was left, so she took $\frac{1}{8}$ of the pack.

Kay took $\frac{1}{2}$.	Salim took $\frac{1}{4}$.	Tonya took $\frac{1}{8}$.	$\frac{1}{8}$ is left.

You got what was left and that was 3 treats.

Kay gets 12.	Salim gets 6.	Tonya gets 3.	You get 3.

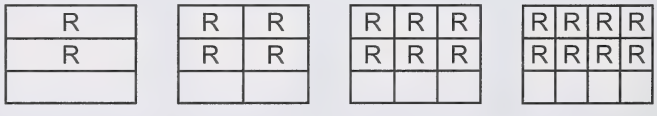
$12 + 6 + 3 + 3 = 24$ There were 24 treats in the bag to start with.

c. Textbook, page 113, Problem Bank, question 6 or 7

6. Ⓡ Ⓡ Ⓡ Ⓡ Ⓡ Ⓡ Ⓑ Ⓑ Ⓑ Ⓑ Ⓑ Ⓑ
Ⓑ Ⓑ Ⓨ Ⓨ Ⓨ Ⓨ Ⓨ Ⓨ ◯ ◯ ◯ ◯

$\frac{4}{24} = \frac{2}{12} = \frac{1}{6}$ of the circles are not coloured.

7.

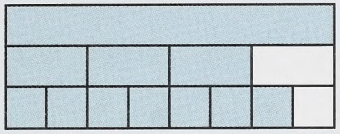


Fraction red $= \frac{2}{3} = \frac{4}{6} = \frac{6}{9} = \frac{8}{12}$

Fraction uncoloured $= \frac{1}{3} = \frac{2}{6} = \frac{3}{9} = \frac{4}{12}$

d. Textbook, page 114, Problem Bank, question 8

Use fraction strips to compare $\frac{3}{4}$ and $\frac{7}{8}$.



1 whole
$\frac{3}{4}$ strip
$\frac{7}{8}$ strip

They are both missing a piece, but the piece missing from $\frac{7}{8}$ of a chocolate is smaller than the piece missing from $\frac{3}{4}$ of a chocolate bar. Therefore, $\frac{7}{8} > \frac{3}{4}$.

e. Textbook, page 114, Problem Bank, question 9

9. a. $\frac{7}{28} = \frac{1}{4}$ of the students chose the water slide.

$\frac{11}{28}$ of the students chose the overnight campout.

$\frac{4}{28} = \frac{1}{7}$ of the students chose the museum.

$\frac{6}{28} = \frac{3}{14}$ of the students chose the national park.

b. No. $\frac{21}{28}$ of the students did not choose the water slide, and $\frac{21}{28}$ is exactly $\frac{3}{4}$.

c. No. $\frac{11}{28}$ of the students chose the overnight campout, and $\frac{11}{28}$ is less than $\frac{1}{2}$.

d. No. The most that could choose another choice is $\frac{15}{28}$, and $\frac{15}{28}$ is less than $\frac{2}{3}$.

f. Textbook, page 115, Problem Bank, question 10

10. a. $\frac{6}{8} = \frac{3}{4}$ **b.** $\frac{8}{12} = \frac{2}{3}$

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